The Sprayer

Operator's Manual

CONTROLLER
ISOBUS VT

Instruction book - SW 3.XX

67023603 - Version 1.10
US - 06.2015

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Welcome letter

Dear New HARDI® Owner,

Thank you for purchasing your new HARDI® product and welcome to the ever-increasing family of proud HARDI® owners.

HARDI® is the leading sprayer company in offering growers strong, reliable products made for the widest range of applications worldwide. Quality, reliability, and resale value make the HARDI® product line the preferred product line of customers both in North America as well as worldwide. Our guiding principle is to provide the highest level of customer satisfaction and long term value in the marketplace today. We have developed a very high level of customer loyalty in the marketplace which we are very proud of and strive every day to maintain and to continue to grow.

HARDI® is your specialist in spraying and we spend all of our time and keep all of our focus on spraying. We do not share our resources between other types of products or compromise on anything in providing the best quality sprayers to the market today. We can provide the latest in technology with our products if desired, or allow them to operate with the technology that you already use on other products in most cases. You get to decide that, and what best suits your needs. We feel that you, our customer, are the best suited to answer that question for your operation. Either way, you decide, and we will try and help make it happen for you.

Our broad spectrum of product offerings, from the ruggedly simple models we build to our highly sophisticated models, the built-in HARDI® strength and reliability ensures a low cost of ownership. HARDI® sprayers are all based on a functional design concept of being as simple to operate as possible and to meet our customers' requirements for all their application needs.

Please take the time to thoroughly read the Operator's Manual before using your equipment. You will find many helpful hints as well as important safety and operation information.

Some of the features on your HARDI® sprayer were suggested by growers. There is no substitute for "on farm" experience and we invite your comments and suggestions. If any portion of this instruction book remains unclear after reading it, contact your HARDI® dealer or service personnel for further explanation before using the equipment.

For Product, Service or Warranty Information please contact your local HARDI® dealer.

- Please use the HARDI® Customer Service number: 1-866-770-7063
- Or send your email to CUSTSERV@hardi-us.com

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Sincerely,

Wayne Buchberger

President

Operator safety

Symbols

These symbols are used throughout the book to designate where the reader needs to pay extra attention.


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 safer operation of your sprayer!


This symbol means NOTE.

Precautions

Note the following recommended precautions and safe operating practices before using the sprayer.

General info


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.


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


Keep children away from the equipment.


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


Local law may demand that the operator is certified to use spray equipment. Adhere to the law.


Tractor driver's seat is the intended working place during operation.

Service


Test with clean water prior to filling with chemicals. Rinse and wash equipment after use and before servicing.


Never service or repair the equipment while it is operating. Always replace all safety devices or shields immediately after servicing.


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. Remove all flammable or explosive material from the area.


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

Introduction

About the ISOBUS VT system

The ISOBUS VT is for use in agricultural and horticultural production. The components are developed to last many years under agricultural conditions.

The system has a non-volatile memory without battery which simplifies storage. All parameters in the menus are saved in the memory and are not lost when the power is disconnected.

Main components	Location
ISOBUS terminal	Tractor/Self-propelled
HC 6300 Grip	Tractor/Self-propelled
HC 6400 SetBox/Spray Center	Tractor/Self-propelled
HC 6100 JobCom	Sprayer/Self-propelled
HC 6200 FluidBox/Outside Box	Sprayer/Self-propelled

The transducers utilized are chosen for long service life and good signal quality. The speed and flow transducers have a built-in diode that will flash to indicate when it's functioning, to aid servicing.

Optional transducers include pressure and revolutions readout. Other options include a 12 Volt printer.

Working pictures will be shown in different colors, depending on the function used.

Display readouts

Among many possible display readouts, are:

- Volume rate.
- Speed.
- Liquid rate per minute.
- Total covered area.
- Total volume sprayed.
- 99 trip registers. It includes a total register that summarizes data from the 98 trip registers.

The system is also compatible with Variable Rate Application (VRA) 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.

Functions include

- Correct area with closure of up to 13 spray boom sections.
- Many alarm functions and possibility for audio/visual alarm etc.
- Many warnings depending on operation. Alarms and warnings is shown in the bottom left 1/4 corner of the display on some VT screens. HC 9500 will show alarms in top of the screen.

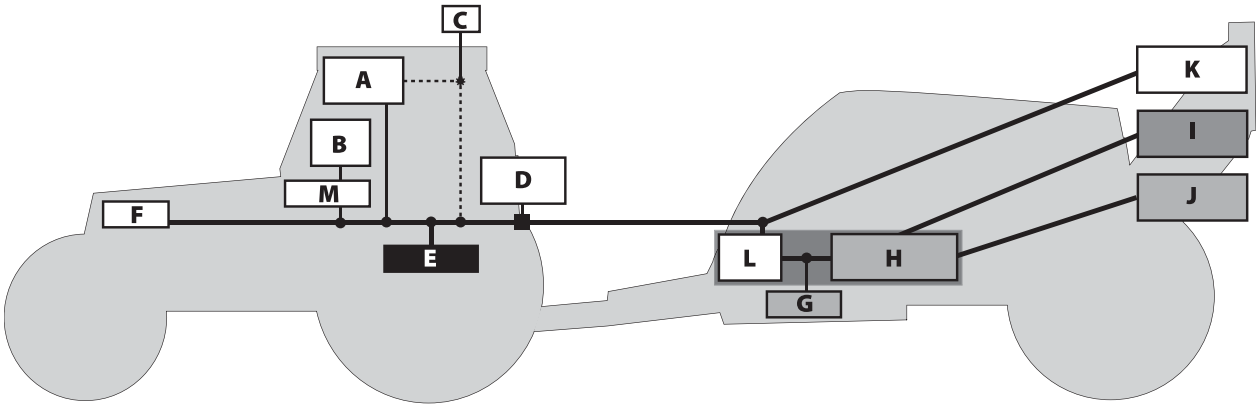
3 - Description

System description

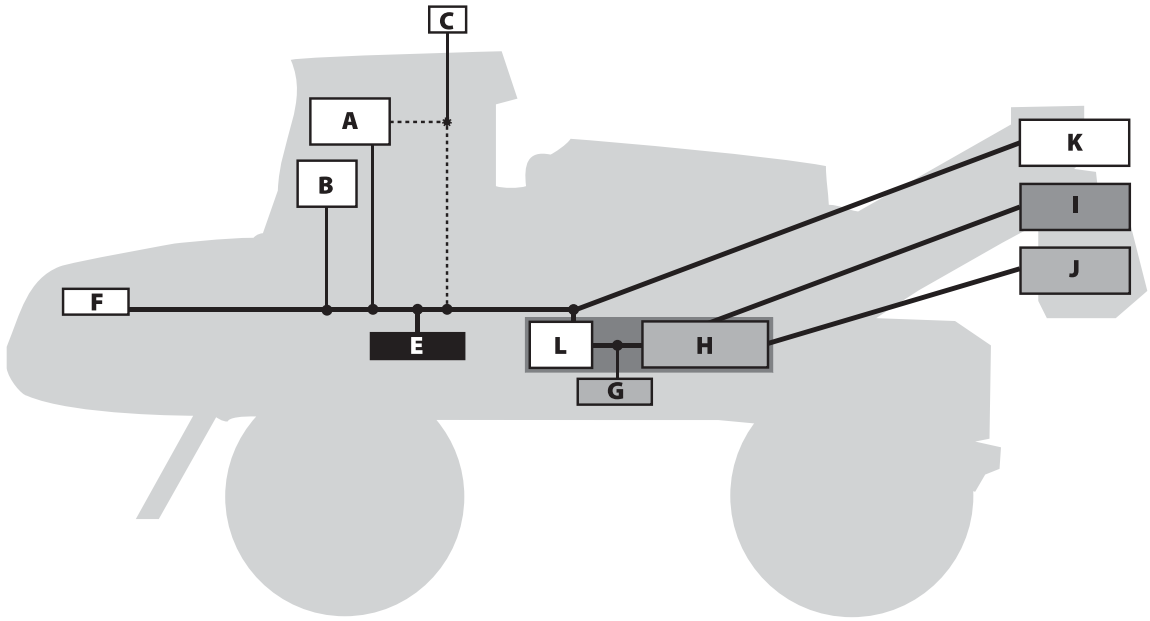
Overall description

The precise wiring setup can vary, depending on the terminal mounted.

ISOBUS system (trailed)



ISOBUS system (self-propelled)



A. HC 9500 or VT Terminal.
B. SetBox and Grip.
C. GPS antenna (optional).
D. IBBC connector.
E. Vehicle bus.
F. ISOBUS.
G. FluidBox (i-sprayers only).
H. JobCom (Implement ECU).
I. Center section junction box.
J. Hydraulics block.
K. AutoHeight UC5.
L. ISOBUS bridge.
M. Cabin connector.

Terminals and boxes

Types of terminals

This software can run with two types of ISOBUS display terminals.

ISOBUS terminals with physical buttons

ISO terminals with physical function buttons, e.g. the Massey Ferguson terminal shown.

- Conventional or touch screen and physical buttons.
- Function buttons are graphical but are operated by physical buttons on the terminal.
- The software runs as a Virtual Terminal (VT) into the terminal software.

ISOBUS terminals with touchscreen interface

HARDI® HC 9500 or similar ISO terminals with touchscreen interface. The HC 9500 is shown.

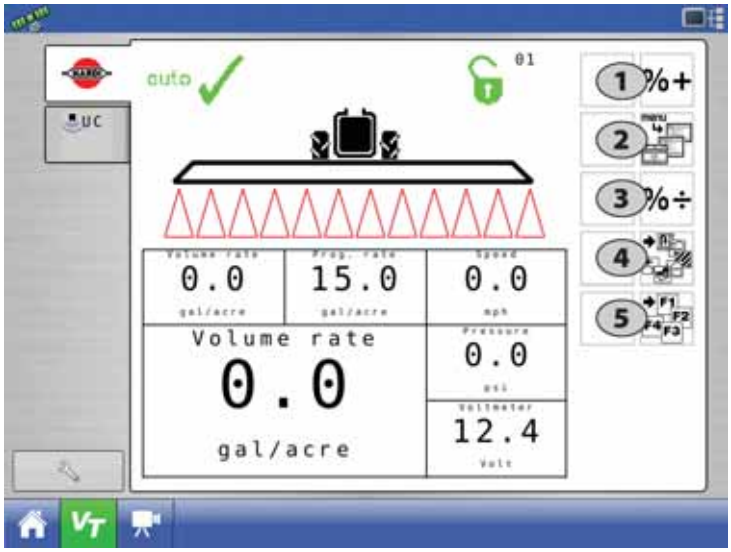
- Touchscreen and no buttons (except ON/OFF).
- Function buttons are graphical and operated by pressing the touch screen.
- The software runs as a Virtual Terminal (VT) into the terminal software.

ISOBUS Terminal layout

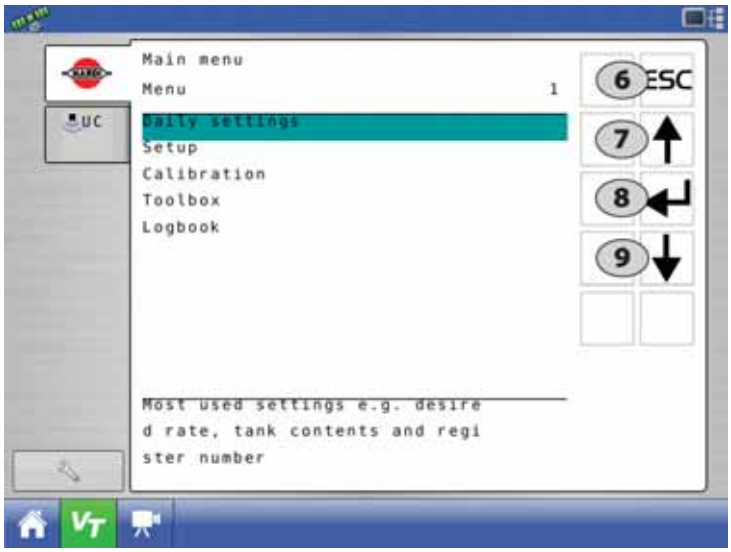
The ISOBUS terminal layout is described as follows:

ISOBUS virtual terminal buttons

1. Scroll up, increase a value or volume rate.
2. Enter menu.
3. Scroll down, decrease a value or volume rate.
4. Preset keys.
5. Soft menus.



6. Escape a menu.
7. Scroll up.
8. Enter menu or confirm a value.
9. Scroll down.



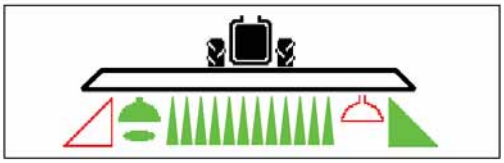
Display symbols

These symbols are common on VT (Virtual Terminal) displays.

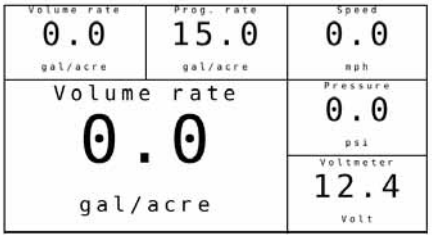
1. The 1st Line is for status symbols, register number and alarm number. All status symbols will be displayed here.

ATTENTION! If an error occurs, alarm/warning error number will be shown instead of register number. The alarm/warning number can be recognized by the exclamation sign in front of the number.

2. The 2nd Line is for boom status, foam marker and end nozzle indications.



3. ISOBUS: The bottom half has 6 boxes with selectable information.



NOTE! See "Menu 2.1 Display readout" on page 6.1 for setup of the display readouts in the bottom half of the terminal display.

1st line status icons

All "OK"

Information

Warning

Stop (critical)

Over or under application

Volume rate Automatic

Variable rate (GPS) active

Volume rate Manual

Pendulum Locked

Pendulum Unlocked

Track Crab left

Track Crab right

Track Lock

Track Automatic

Track Manual

Options A on

Options B on

Options both on

Options both off

TWIN Preset 1

TWIN Preset 2

TWIN Manual

Auto mode
Nozzle size calculated

Auto mode
No flow to sections

Auto mode
Nozzle size not calculated

Manual mode
Nozzle size calculated

Manual mode
No flow to sections

Manual mode
Nozzle size not calculated

Increment steps mode
Nozzle size calculated

Increment steps mode
No flow to sections

Increment steps mode
Nozzle size not calculated

3 - Description

A. Preset keys

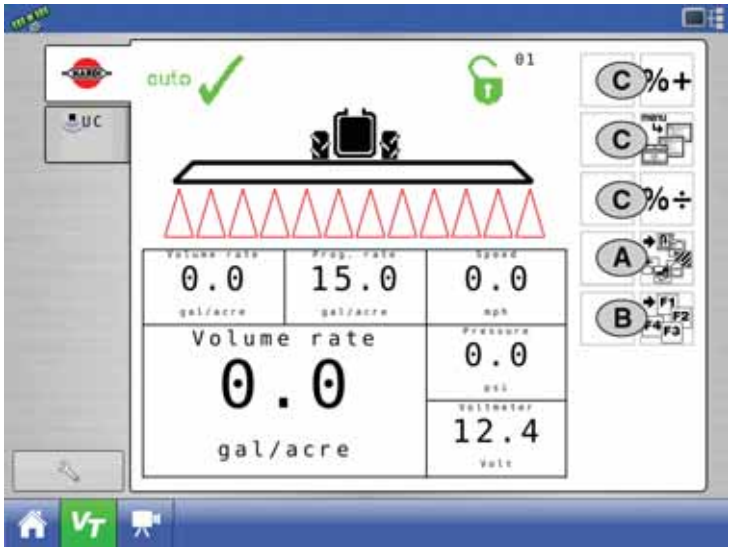
Vital information while spraying is quick and easy to access.

Pressing the button will enter a submenu with the preset keys.

B. Soft keys

Soft keys control optional features. Press the soft key button to activate a submenu with further features.

ATTENTION! The number of levels in the soft key menu system depends on the number of functions - see also "Soft keys menu tree" below.



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. Other keys appear as needed on the ISOBUS Terminal.

ISOBUS		Description
ESC	This key appears whenever necessary at respective menus, etc. See "ESC key for ISOBUS terminals" on page 6.1 for setup of this button.	Used to escape back to previous screen.
↑	This key appears whenever necessary at respective menus, etc.	Used to scroll up.
↵	This key appears whenever necessary at respective menus, etc.	Used to enter a menu or confirm a value.
↓	This key appears whenever necessary at respective menus, etc.	Used to scroll down.
CLR	This is normally a key in the standard numeric keypad of the specific terminal.	Used to clear a value or register.

D. Numeric keys

The keys will be the standard numeric keypad for the specific ISOBUS terminal.

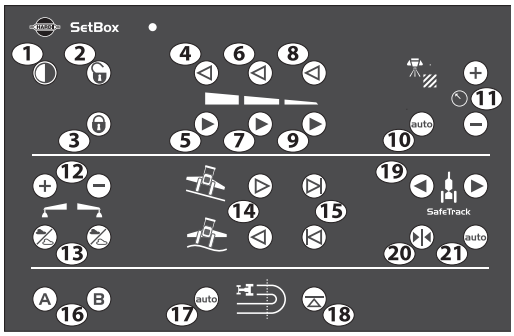
Soft keys menu tree

LEVEL 1		LEVEL 2		LEVEL 3		LEVEL 4
ICON	FUNCTION	ICON	FUNCTION	ICON	FUNCTION	
	F1 EndNozzles		F1 Left ON		Work screen	
			F2 Left OFF			
			F3 Right OFF		Work screen	
			F4 Right OFF			

SetBox

The SetBox controls secondary functions. The keys are grouped into control areas to simplify operator understanding.

NOTE! Self-propelled sprayers do not have a SetBox as the controls are built-in to the cabin.



1. Power ON/OFF.
2. Pendulum unlock.
3. Pendulum lock.
4. Inner wing fold.
5. Inner wing unfold.
6. 1st outer wing fold.
7. 1st outer wing unfold.
8. 2nd outer wing fold.
9. 2nd outer wing unfold.
10. Automatic volume rate selector.
11. Manual pressure control.
12. Foam marker regulation.
13. Foam marker Left/Right selector.
14. DynamicCenter adjustment (increments).
15. DynamicCenter outer positions 1 or 5.
16. Optional function A-B.
17. HeadlandAssist automatic.
18. HeadlandAssist boom align.
19. SafeTrack manual control (if installed).
20. SafeTrack align selector (if installed).
21. SafeTrack automatic selector (if installed).

ATTENTION! Button 1 has different function on ISOBUS sprayers as this turns the JobCom ON/OFF.

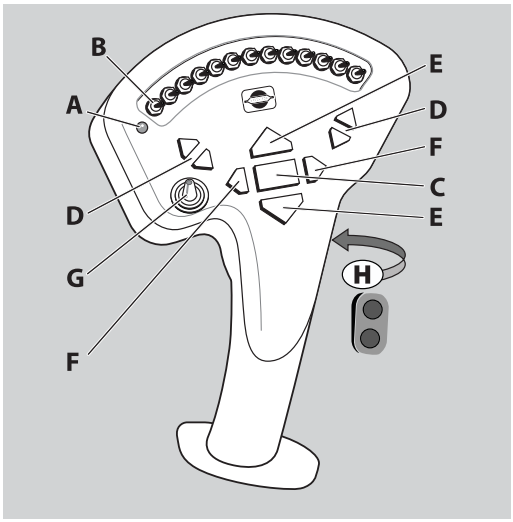
ATTENTION! Buttons 17 and 18 can have different functions if the sprayer is equipped with AutoHeight.

ATTENTION! The Grip cannot be switched ON/OFF separately. It is automatically switched ON when tractor power is turned ON (ISOBUS).

3 - Description

HC 6300 Grip

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



ATTENTION! The Grip cannot be switched ON/OFF separately. It is automatically switched ON when tractor power is turned ON (ISOBUS).

A. Status LED.

B. Boom section controls (up to 13).

C. Main ON/OFF.

D. Tilt.

E. Boom height.

F. Boom slant.

G. Not used.

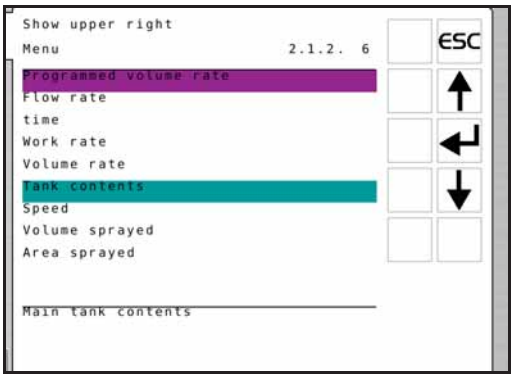
H. TWIN presets.

General keystrokes

The first steps to choose a menu are shown below. See also "Full menu structure" on page 3.15.

Menu selection

1. Press {Menu} Virtual Terminal button to proceed into the menu.
2. Navigate to desired submenu using arrows.
3. In the menu, the current selection is marked with a colored bar.
4. Move the menu colored bar up and down by using the {up} and {down} arrows.



NOTE! A maroon colored bar indicates current setting.

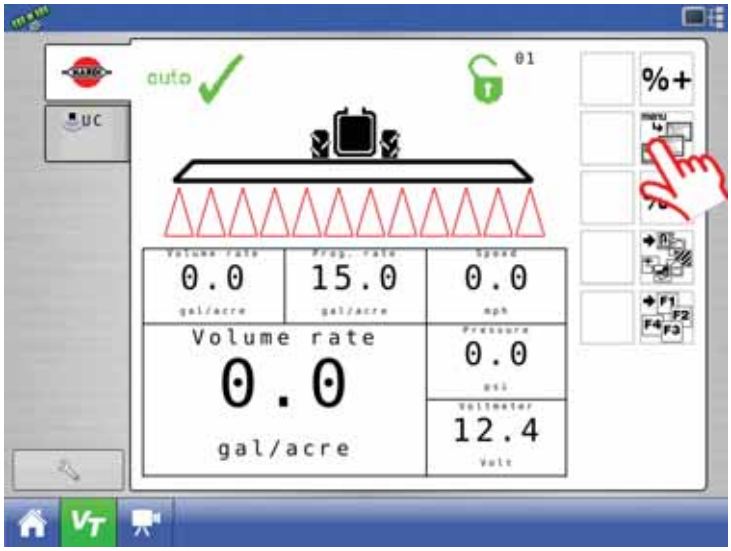
5. Confirm selection by pressing the enter arrow.

ATTENTION! Press {ESC} to leave the menu without changing values.

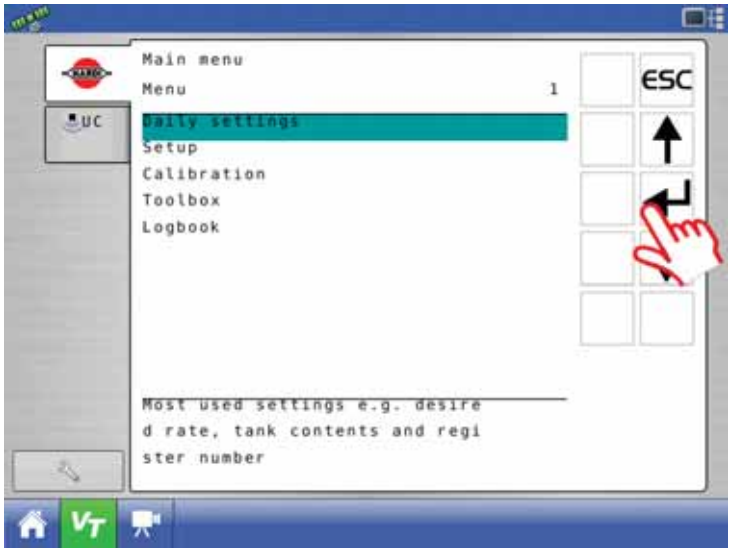
NOTE! There is help text for each menu in the bottom of the display. The displayed help text corresponds to the location of the colored bar on the Virtual Terminal.

Menu editing example: Tank contents ISOBUS VT

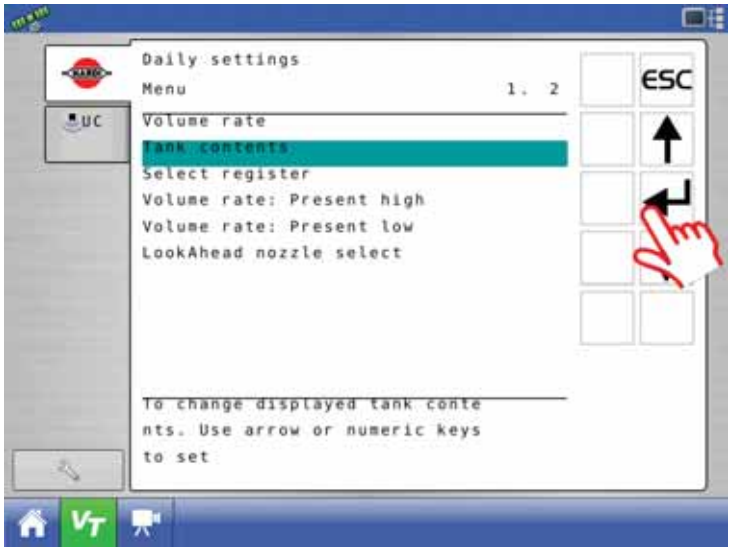
1. At main ISOBUS VT screen select {Menu} to enter menus.



2. With "Daily Settings" highlighted, select {Enter} to confirm.

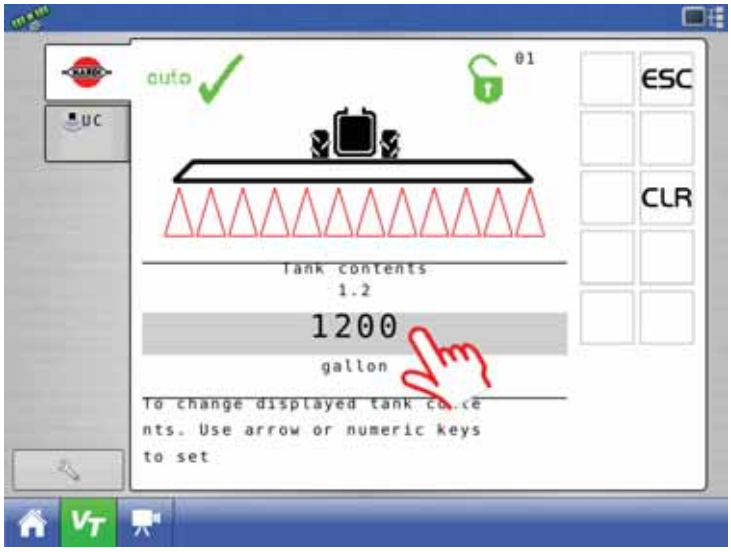


3. Scroll to "Tank contents" with {up} or {down} arrows and select enter to confirm.



ATTENTION! The procedure for the following two steps can vary between ISOBUS terminals. Procedure for HC 9500 terminal is shown here.

4. Select the value field to enter a value.



5. Enter the new tank contents value on the numeric key pad and select check mark to confirm.

Extended menu

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

- For ISOBUS terminals the extended menu is accessible from menu 2.8 and requires a pin code to enter.

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

Functions

Auto functions general info

The Soft key buttons are used for the End Nozzle functions.

ATTENTION! Refer to “B. Soft keys” on page 3.6 for information about how to enter the soft keys.

End nozzles (Fence line) (optional)

If End nozzles/Bi-jet are fitted, set the value to the equivalent coverage by the boom nozzles. E.g. End nozzle coverage is 5 feet. This is equal to [03 Boom nozzles]. Choose End Nozzles by pressing F1.

- When end nozzle is active, it will be shown in the display with two icons at the ends 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 Bi-jet matches the volume applied under the boom. This is a comparison of volume per minute per length. (Liter/min/meter).

When the end nozzle or Bi-jet 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 Bi-jet is activated.

DynamicFluid4 pressure regulation

Traditional fluid regulation starts when the nozzles are opened. With DynamicFluid4 the regulation is a continuous process that continues even if the nozzles are closed. Two ceramic discs regulate the pressure and ensures quick reaction and zero leakages. Sprayer speed, P.T.O. RPM and number of sections activated are parameters used, and the benefit is more precise application rates from the second the sprayer begins spraying.

The DynamicFluid4 uses feed forward technology based on 5 sensors that feed the JobCom computer with data necessary for optimal regulation. It auto-primes at start-up, starts and moves the valve towards the final position immediately after the operator makes changes. E.g. when section valves are opened or closed, the regulation valve is started the same time the section valve motors are started. This avoids overpressure situations e.g. after running empty and refill of main tank.

The 5 sensors are also back-up for each other and ensures the system can continue regulation even if one or more sensor signals fail. Sensors used are:

- Sprayer speed sensor
- Flow sensor
- Pressure sensor
- Pump r.p.m. sensor
- Regulation valve opening angle sensor

The DynamicFluid4 pressure regulation features are:

- Very fast and accurate regulation when all sensors are ok, setup in menus are correct and pump, filters and valves are in good condition.
- Quick reacting valve when sections are turned ON/OFF and at speed changes.
- Optimized AutoSectionControl feature that predicts when boom sections will open and nozzle pressure.
- Optimized for different P.T.O. systems.
- Nozzle surveillance. No setup or tuning required for nozzle change.
- Warning in display if failures occur on boom plumbing, such as severe clogging of line or nozzle filters or large leakages on hoses and fittings.
- All functions continue working, although with degraded performance (Limp home modes), if:

  Faults occur in fluid system, e.g. pump defects, clogged filters, leaking valves.

  Sensor failure appears on pressure sensor, flow sensor or RPM sensor.

  There is wrong setup of sprayer data in menus.
- Emergency mode if angle sensor or speed sensor fails.

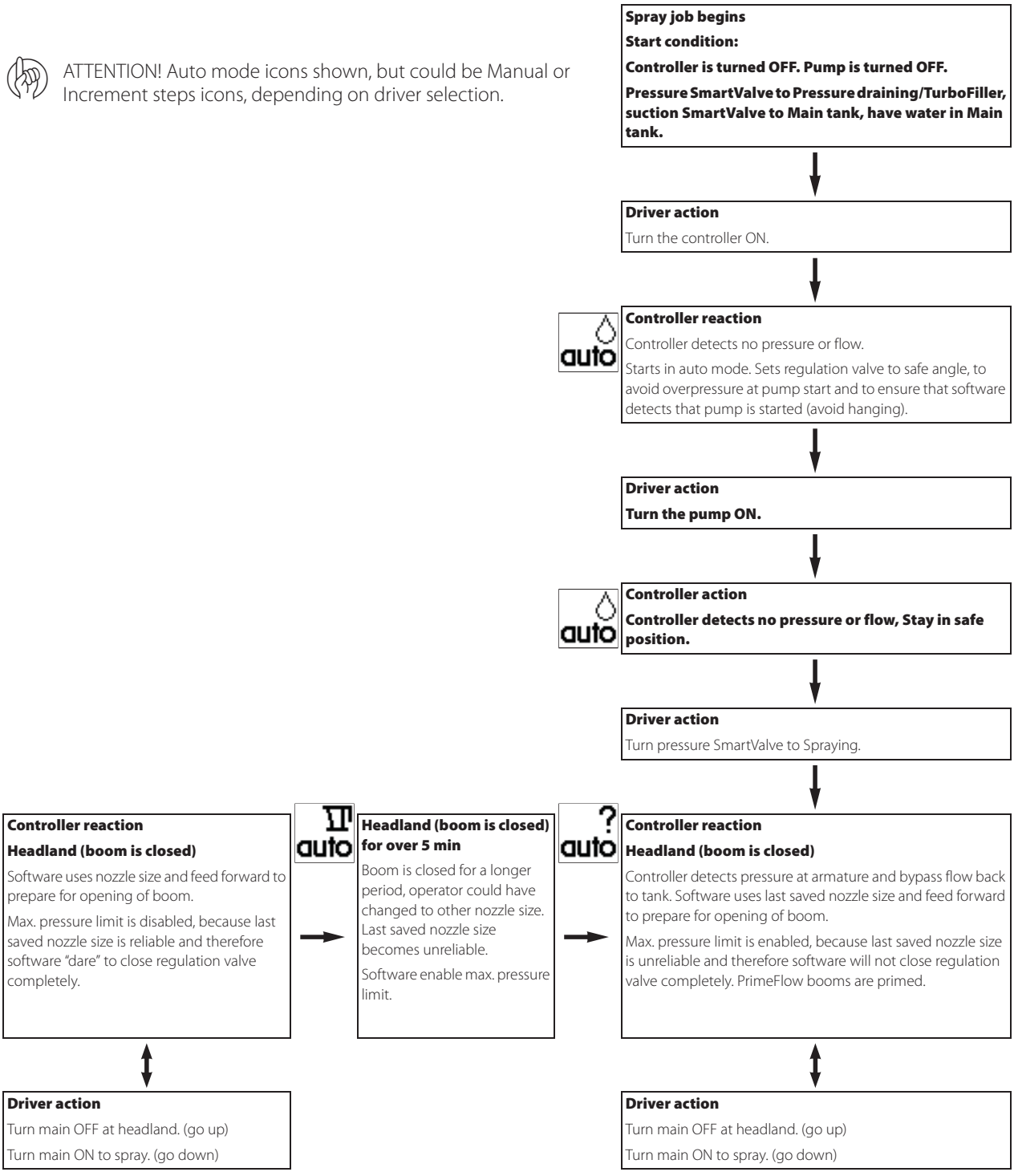
Screen icons

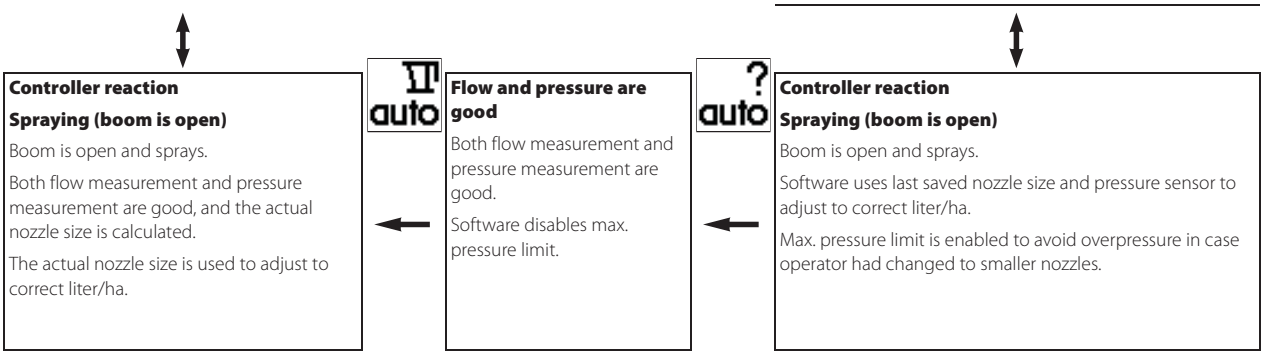
The sprayer driver selects one of three modes Auto, Manual or Increment steps. The sprayer computer detects one of three regulation modes Drop, Question mark or calibration jug. This makes 9 modes in total.

Auto When Automatic Volume Rate button is pressed on the SetBox.	**Manual** When one of the Manual pressure control buttons is pressed on the SetBox.	**Increment steps** When the Volume Rate is changed in steps with %-up or %-down buttons on the Terminal.	
			**Calibration jug** There is flow to section valves. Nozzle size (L/min at 3 bar) has been calculated.
			**Drop** There is no flow to section valves. The pump is not started or the pressure SmartValve is set to other function than spraying.
			**Question mark** There is flow to section valves but pressure and flow has not yet been stable, therefore the nozzle size (L/min at 3 bar) has not been calculated. The system uses the previously stored nozzle size.

Regulation valve function diagram

ATTENTION! Auto mode icons shown, but could be Manual or Increment steps icons, depending on driver selection.





SafeTrack (Trailed sprayers only)

SafeTrack is a steering mechanisms for the trailed 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 behavior
- Field conditions
- Tire width
- Tire pressure

Read sprayer's instruction book for further information. If unsafe driving occurs, an alarm will be triggered and the sprayer will align. Be aware that the alarm cannot be turned off as long as unsafe driving still occurs!

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.

HARDI® AutoSectionControl (optional)

HARDI® AutoSectionControl will:

- manage the sections when driving over sprayed area, like into a headland or wedge or around obstacles like trees, etc.
- automatically record the area sprayed, when spraying.

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.

ATTENTION! Variable Rate Application needs to be enabled for AutoSectionControl to work - refer to "Menu 2.3 Variable Rate Application (VRA) / Remote / HARDI® AutoSectionControl" on page 6.3.

ATTENTION! For more information about AutoSectionControl, see the AutoSectionControl instruction book. On ISOBUS terminals AutoSectionControl can be an integrated part - if so, refer to the ISOBUS terminal instruction book.

Menus

Full menu structure

NOTE! Blank fields are menus without name or description.

NOTE! Menus marked with a grey box are not for ISOBUS terminals.

Menu number	Menu name	Description / Help text
1	Daily settings	Most used settings e.g. desired rate, tank contents and register number
1. 1	Volume rate	Use arrow keys or numeric keys to set the desired volume rate
1. 2	Tank contents	To change displayed tank contents. Use arrow keys or numeric keys to set
1. 3	Select register	Use register 1 to 99 for job. Scroll to register, then press Enter to show data
1. 3. 1		
1. 3. 1. 1	Show register spray data 1	Press C for 5 sec to reset register. Enter to see screen 2, ESC to leave
1. 3. 1. 1. 1	Start date	
1. 3. 1. 1. 2	Start time	
1. 3. 1. 1. 3	End date	
1. 3. 1. 1. 4	End time	
1. 3. 1. 2	Show register spray data 2	Press C for 5 sec to reset register, Enter to see screen 1, ESC to leave
1. 3. 1. 2. 1	Volume applied	
1. 3. 1. 2. 2	Area covered	
1. 3. 1. 2. 3	Average spray speed	
1. 3. 1. 2. 4	Maximum spray speed	
1. 3. 1. 2. 5	Travelled spray dist	
1. 3. 1. 2. 6	Time used spraying	
1. 3. 1. 2. 7	Work rate	
1. 3. 1. 2. 8	Average volume rate	
1. 4	Volume rate: Preset high	Rate selected with1 press on the arrow up-key
1. 5	Volume rate: Preset low	Rate selected with1 press on the arrow down-key

2	Setup	Customizing of display, automatic functions, clock, alarms, registers, etc
2. 1	Display readout	Customizes the 4 small display readouts
2. 1. 1	Show upper middle	
2. 1. 1. 01	Programmed volume rate	Shows Programmed volume rate
2. 1. 1. 02	Boom flow	Boom 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 hectare per hour or acre per hour
2. 1. 1. 05	Actual volume rate	Actual rate in liter 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	Pendulum lock status	Displays reading of pendulum lock sensor if fitted
2. 1. 1. 15	Pendulum unlock status	Displays reading of pendulum unlock sensor if fitted
2. 1. 1. 16	Dynamic center position	Displays Dynamic center position sensor if fitted
2. 1. 1. 17	Spray pump rev	Displays revolutions if sensor is fitted
2. 1. 1. 18	Extra sensor 1F	Readout from extra sensor 1 frequency
2. 1. 1. 19	Extra sensor 2F	Readout from extra sensor 2 frequency
2. 1. 1. 20	Extra sensor 3A	Readout from extra sensor 3 analog
2. 1. 1. 21	Extra sensor 4A	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	RinseTank content	RinseTank calculated content
2. 1. 1. 25	Slant angle	Headland assist angle sensor
2. 1. 1. 26	Boom height	Headland assist height sensor
2. 1. 1. 27	Reserved	R R
2. 1. 1. 28	Reserved	R R
2. 1. 1. 29	Reserved	R R
2. 1. 1. 30	Reserved	R R
2. 1. 1. 31	Reserved	R R
2. 1. 1. 32	Reserved	R R
2. 1. 1. 33	Nozzle size flow at 3 bar (45 psi)	Calculated nozzle flow at 3 bar (45 psi)
2. 1. 1. 34		
2. 1. 1. 35		
2. 1. 1. 36		
2. 1. 1. 37	PF bus +	Voltage on PrimeFlow databus +
2. 1. 1. 38	PF bus -	Voltage on PrimeFlow databus -
2. 1. 2	Show upper right	
2. 1. 2. 01	Programmed volume rate	Shows Programmed volume rate
2. 1. 2. 02	Boom flow	Boom flow rate per minute sprayed out through the boom
2. 1. 2. 03	time	Actual time
2. 1. 2. 04	Work rate	Rate shown in hectare per hour or acre per hour
2. 1. 2. 05	Actual volume rate	Actual rate in liter per hectare or gallon per acre
2. 1. 2. 06	Tank contents	Main tank contents
2. 1. 2. 07	Speed	Driving speed
2. 1. 2. 08	Volume sprayed	Readouts for Volume sprayed in currently active register
2. 1. 2. 09	Area sprayed	Readouts for Area sprayed in currently active register
2. 1. 2. 10	Active boom size	Active boom size including end nozzle
2. 1. 2. 11	Pressure	Displays spray pressure if sensor is fitted
2. 1. 2. 12	Fan speed	Displays Twin fan speed if sensor is fitted
2. 1. 2. 13	Wind Speed	Displays wind speed if sensor is fitted
2. 1. 2. 14	Pendulum lock status	Displays reading of pendulum lock sensor if fitted
2. 1. 2. 15	Pendulum unlock status	Displays reading of pendulum unlock sensor if fitted
2. 1. 2. 16	Dynamic center position	Displays Dynamic center position sensor if fitted
2. 1. 2. 17	Spray pump rev	Displays revolutions if sensor is fitted
2. 1. 2. 18	Extra sensor 1F	Readout from extra sensor 1 frequency
2. 1. 2. 19	Extra sensor 2F	Readout from extra sensor 2 frequency
2. 1. 2. 20	Extra sensor 3A	Readout from extra sensor 3 analog
2. 1. 2. 21	Extra sensor 4A	Readout from extra sensor 4 analog
2. 1. 2. 22	Voltmeter	Displays system voltage. Useful when fault finding
2. 1. 2. 23	Agitation	Agitation valve opening
2. 1. 2. 24	RinseTank content	RinseTank calculated content
2. 1. 2. 25	Slant angle	Headland assist angle sensor
2. 1. 2. 26	Boom height	Headland assist height sensor
2. 1. 2. 27	Reserved	R R
2. 1. 2. 28	Reserved	R R
2. 1. 2. 29	Reserved	R R
2. 1. 2. 30	Reserved	R R
2. 1. 2. 31	Reserved	R R
2. 1. 2. 32	Reserved	R R
2. 1. 2. 33	Nozzle size flow at 3 bar (45 psi)	Calculated nozzle flow at 3 bar (45 psi)
2. 1. 2. 34		
2. 1. 2. 35		
2. 1. 2. 36		
2. 1. 2. 37	PF bus +	Voltage on PrimeFlow databus +
2. 1. 2. 38	PF bus -	Voltage on PrimeFlow databus -
2. 1. 3	Show lower middle	
2. 1. 3. 01	Programmed volume rate	Shows Programmed volume rate
2. 1. 3. 02	Boom flow	Boom flow rate per minute sprayed out through the boom

2. 1. 3. 03	time	Actual time
2. 1. 3. 04	Work rate	Rate shown in hectare per hour or acre per hour
2. 1. 3. 05	Actual volume rate	Actual rate in liter per hectare or gallon per acre
2. 1. 3. 06	Tank contents	Main tank contents
2. 1. 3. 07	Speed	Driving speed
2. 1. 3. 08	Volume sprayed	Readouts for Volume sprayed in currently active register
2. 1. 3. 09	Area sprayed	Readouts for Area sprayed in currently active register
2. 1. 3. 10	Active boom size	Active boom size including end nozzle
2. 1. 3. 11	Pressure	Displays spray pressure if sensor is fitted
2. 1. 3. 12	Fan speed	Displays Twin fan speed if sensor is fitted
2. 1. 3. 13	Wind Speed	Displays wind speed if sensor is fitted
2. 1. 3. 14	Pendulum lock status	Displays reading of pendulum lock sensor if fitted
2. 1. 3. 15	Pendulum unlock status	Displays reading of pendulum unlock sensor if fitted
2. 1. 3. 16	Dynamic center position	Displays Dynamic center position sensor if fitted
2. 1. 3. 17	Spray pump rev	Displays revolutions if sensor is fitted
2. 1. 3. 18	Extra sensor 1F	Readout from extra sensor 1 frequency
2. 1. 3. 19	Extra sensor 2F	Readout from extra sensor 2 frequency
2. 1. 3. 20	Extra sensor 3A	Readout from extra sensor 3 analog
2. 1. 3. 21	Extra sensor 4A	Readout from extra sensor 4 analog
2. 1. 3. 22	Voltmeter	Displays system voltage. Useful when fault finding
2. 1. 3. 23	Agitation	Agitation valve opening
2. 1. 3. 24	RinseTank content	RinseTank calculated content
2. 1. 3. 25	Slant angle	Headland assist angle sensor
2. 1. 3. 26	Boom height	Headland assist height sensor
2. 1. 3. 27	Reserved	R R
2. 1. 3. 28	Reserved	R R
2. 1. 3. 29	Reserved	R R
2. 1. 3. 30	Reserved	R R
2. 1. 3. 31	Reserved	R R
2. 1. 3. 32	Reserved	R R
2. 1. 3. 33	Nozzle size flow at 3 bar (45 psi)	Calculated nozzle flow at 3 bar (45 psi)
2. 1. 3. 34		
2. 1. 3. 35		
2. 1. 3. 36		
2. 1. 3. 37	PF bus +	Voltage on PrimeFlow databus +
2. 1. 3. 38	PF bus -	Voltage on PrimeFlow databus -
2. 1. 4	Show lower right	
2. 1. 4. 01	Programmed volume rate	Shows Programmed volume rate
2. 1. 4. 02	Boom flow	Boom flow rate per minute sprayed out through the boom
2. 1. 4. 03	time	Actual time
2. 1. 4. 04	Work rate	Rate shown in hectare per hour or acre per hour
2. 1. 4. 05	Actual volume rate	Actual rate in liter per hectare or gallon per acre
2. 1. 4. 06	Tank contents	Main tank contents
2. 1. 4. 07	Speed	Driving speed
2. 1. 4. 08	Volume sprayed	Readouts for Volume sprayed in currently active register
2. 1. 4. 09	Area sprayed	Readouts for Area sprayed in currently active register
2. 1. 4. 10	Active boom size	Active boom size including end nozzle
2. 1. 4. 11	Pressure	Displays spray pressure if sensor is fitted
2. 1. 4. 12	Fan speed	Displays Twin fan speed if sensor is fitted
2. 1. 4. 13	Wind Speed	Displays wind speed if sensor is fitted
2. 1. 4. 14	Pendulum lock status	Displays reading of pendulum lock sensor if fitted
2. 1. 4. 15	Pendulum unlock status	Displays reading of pendulum unlock sensor if fitted
2. 1. 4. 16	Dynamic center position	Displays Dynamic center position sensor if fitted
2. 1. 4. 17	Spray pump rev	Displays revolutions if sensor is fitted
2. 1. 4. 18	Extra sensor 1F	Readout from extra sensor 1 frequency
2. 1. 4. 19	Extra sensor 2F	Readout from extra sensor 2 frequency
2. 1. 4. 20	Extra sensor 3A	Readout from extra sensor 3 analog

2. 1. 4. 21	Extra sensor 4A	Readout from extra sensor 4 analog
2. 1. 4. 22	Voltmeter	Displays system voltage. Useful when fault finding
2. 1. 4. 23	Agitation	Agitation valve opening
2. 1. 4. 24	RinseTank content	RinseTank calculated content
2. 1. 4. 25	Slant angle	Headland assist angle sensor
2. 1. 4. 26	Boom height	Headland assist height sensor
2. 1. 4. 27	Reserved	R R
2. 1. 4. 28	Reserved	R R
2. 1. 4. 29	Reserved	R R
2. 1. 4. 30	Reserved	R R
2. 1. 4. 31	Reserved	R R
2. 1. 4. 32	Reserved	R R
2. 1. 4. 33	Nozzle size flow at 3 bar (45 psi)	Calculated nozzle flow at 3 bar (45 psi)
2. 1. 4. 34		
2. 1. 4. 35		
2. 1. 4. 36		
2. 1. 4. 37	PF bus +	Voltage on PrimeFlow databus +
2. 1. 4. 38	PF bus -	Voltage on PrimeFlow databus -
2. 1. 5	Show ESC softkey to leave	ISObus terminal can have a separate ESC key or use an ESC softkey
2. 1. 5. 1	Show ESC as softkey	Choose this to show ESC key as softkey on ISObus terminal
2. 1. 5. 2	Do not show ESC as softkey	Choose this if ISObus terminal has a separate ESC key.
2. 2	AUTO functions	Set up for Auto ON/OFF, Foam marker, HeadlandAssist and optional A/B
2. 2. 1	Main ON/OFF	For automatic operation of the main ON/OFF function at a pre-set speed
2. 2. 2	Foam marker	To operate via the main ON/OFF function and automate side choice
2. 2. 2. 1	Disable	It will only follow the manual setting of the switch on the SetBox
2. 2. 2. 2	Same side	It will automatically activate the same side for race-track spraying
2. 2. 2. 3	Change side	It will automatically change side for up and back spraying
2. 2. 3	Dual Line	To set up lower and upper trigger limits for the operation of line A and line B
2. 2. 3. 1	Lower pressure level	Key in pressure level to switch Dual Line to smaller nozzles
2. 2. 3. 2	Upper pressure level	Key in pressure level to switch Dual Line to bigger nozzles
2. 2. 3. 3	From A to B speed level	Key in speed to switch Dual Line from A to B
2. 2. 3. 4	From B to A+B speed level	Key in speed to switch Dual Line from B to A+B
2. 2. 4	HeadlandAssist setup	Boom lift and lower automatically when switching main ON/OFF function
2. 2. 4. 1	ON/OFF delay	Distance delay so the boom will lift or lower via the main ON/OFF
2. 2. 4. 2	Boom height at headlands	Key in 0 to disable HeadlandAssist Key in a height to enable
2. 2. 4. 3	Slant mirror or in steps	Activate headland assist slant mirror or slant in steps.
2. 2. 4. 3. 1	Slant mirror and steps disable	Traditional slant. No slant mirror. No slant in steps.
2. 2. 4. 3. 2	Slant mirror enable	Activate opposite slant at headlands. Slant in steps not possible.
2. 2. 4. 3. 3	Slant in steps enable	Activate slant in steps. Set step size in 2.2.4.4. Slant mirror not possible.
2. 2. 5	TWIN preset shift auto / man	Shifts automatically at main ON/OFF or manually at keypress
2. 2. 5. 1	Manual shift at keypress	Upon keypress it will change to the other preset value
2. 2. 5. 2	Auto shift at main ON/OFF	It will automatically change to the other preset value
2. 2. 5. 3	TWIN controls disabled	TWIN fan, angle and preset controls are disabled
2. 2. 6	AutoAgitation select level	Powerful or soft no Agitation
2. 2. 6. 1	Powerful AutoAgitation	Recommended for powder
2. 2. 6. 2	Soft AutoAgitation	Recommended for liquid chemical
2. 2. 6. 3	No agitation	Never use if sedimentation occurs. Recommended for liquid fertilizer.
2. 2. 6. 4	Fixed agitation	Valve is positioned
2. 2. 6. 5	Agitation switch	Switch increase or decrease agitation
2. 2. 7	AutoAgitation fixed level	Key in position of agitation valve for FluidBox key and fixed level
2. 3	VRA / Remote control	Variable Rate Application by RS232 Auto Section Control
2. 3. 1	VRA / Remote control disable	Variable Rate Application / Remote control disabled. Dish icon disappear
2. 3. 2	VRA / Remote control enable	by RS232 data port control enabled. Dish icon will be shown
2. 4	Set clock	Change date and clock time
2. 4. 1	Time format (12 or 24 hour)	Choose between a 12 hour or 24 hour clock
2. 4. 1. 1	12 hour format	You have chosen 12 hours as your time unit
2. 4. 1. 2	24 hour format	You have chosen 24 hours as your time

2. 4. 2	Set time	Set the actual time. Use arrow keys or numeric keys, then press Enter
2. 4. 3	Set date and month	Set date and month. Use arrow keys or numeric keys, then press Enter
2. 4. 4	Set year	Set year. Use arrow keys or numeric keys, then press Enter
2. 5	Alarms	Different alarms can be set up. Choices will be listed
2. 5. 01	Volume rate alarm	Over or under application alarm
2. 5. 01. 1	High volume rate limit	Over application warning for volume rate when over in 20 seconds
2. 5. 01. 2	Low volume rate limit	Under application warning for volume rate when under in 20 seconds
2. 5. 02	Tank contents at minimum	Warning given when tank contents is below this volume
2. 5. 03	Spray pressure	High and low spray pressure alarm
2. 5. 03. 1	High spray pressure limit	Warning given when spray pressure is above value
2. 5. 03. 2	Low spray pressure limit	Warning given when under this pressure
2. 5. 04	Fan speed alarm	High and low r/min alarm
2. 5. 04. 1	High fan revolutions limit	Warning given when over this value
2. 5. 04. 2	Low fan revolutions limit	Warning given when under this value
2. 5. 05	Speed alarm	Speed maximum and minimum alarm
2. 5. 05. 1	Maximum speed value	Warning will be given if spraying over this value
2. 5. 05. 2	Minimum speed value	Warning will be given if spraying under this value
2. 5. 06	Wind speed	Displays wind speed if sensor is fitted
2. 5. 07	PTO r/min alarm	PTO revolutions maximum and minimum alarm
2. 5. 07. 1	Maximum value	Alarm value for the maximum revolutions on the PTO
2. 5. 07. 2	Minimum value	Alarm value for the minimum revolutions
2. 5. 08	R/minute alarm	Revolutions maximum and minimum alarm
2. 5. 08. 1	Maximum value	Alarm value for the maximum revolutions on the PTO
2. 5. 08. 2	Minimum value	Alarm value for the minimum revolutions
2. 5. 09	Reserved	
2. 5. 09. 1	Reserved	
2. 5. 09. 2	Reserved	
2. 5. 10	R/minute alarm	Revolutions maximum and minimum alarm
2. 5. 11	R/minute max	Value (PPU) maximum and minimum alarm
2. 5. 13	R/minute min	Value (Volt) maximum and minimum alarm
2. 5. 15	Sections OFF warning	Main ON/OFF is switched to ON and some sections are switched to OFF
2. 5. 15. 1	Enabled	Press Enter to enable warning when sections are OFF
2. 5. 15. 2	Disabled	Press Enter to disable warning
2. 5. 16	Audio level	Audio steps for alarm volume. 0 is for no sound
2. 5. 16. 0	Sound step 0	0 = no sound, 5 is maximum volume
2. 5. 16. 1	Sound step 1	0 = no sound, 5 is maximum volume
2. 5. 16. 2	Sound step 2	0 = no sound, 5 is maximum volume
2. 5. 16. 3	Sound step 3	0 = no sound, 5 is maximum volume
2. 5. 16. 4	Sound step 4	0 = no sound, 5 is maximum volume
2. 5. 16. 5	Sound step 5	0 = no sound, 5 is maximum volume
2. 6	Register names	Register set up. Once done, a name can be copied and edited
2. 6. 1 up to 99	Register name	Toggle numeric keyboard to key in Register name
2. 7	Setup display	Setup for brightness, contrast and day/night colors
2. 7. 1	Choose day/night colors	Color change makes the display easier to read at day and night
2. 7. 1. 1	Day colors	Select this for day-time spraying Black text on white background
2. 7. 1. 2	Night colors	Select this for night-time spraying White text on black background
2. 7. 2	Setup brightness	Brightness can be stepped
2. 7. 2. 1	High brightness	Maximum setting
2. 7. 2. 2	Medium	Medium setting
2. 7. 2. 3	Low brightness	Minimum setting
2. 8	Extended menu	Extended menu for dealers setup to match features on sprayer

3	Calibration	Basic calibration,e.g. speed, boom, regulation constant, tank and track
3. 1	Speed calibration	Sprayer, tractor, Alpha or radar speed input. Calibration of selected sensor
3. 1. 1	Sprayer speed	Speed sensor mounted on trailed sprayer Connected to armature junction box
3. 1. 1. 1	Sprayer speed constant	Shows and permits change to the constant, Pulses Per Unit (meter / feet)
3. 1. 1. 2	Sprayer speed practical	Preferred method. Do in field with spray tank half full for most accurate result

3. 1. 1. 2. 1	Sprayer practical	Measure up a distance more than 70 meters or 200 feet. Then drive distance
3. 1. 1. 2. 2		Now key in the exact distance, measured by a measuring tape
3. 1. 1. 2. 3		This is the new constant (pulses per meter or feet)
3. 1. 2	Tractor Alpha speed	Alpha, or sensor located on tractor Sensor cable connected to Terminal
3. 1. 2. 1	Tractor speed constant	
3. 1. 2. 2	Tractor practical	Preferred method. Do in field with spray tank half full for most accurate result
3. 1. 3	Radar speed	Choose if radar speed sensor is used
3. 1. 3. 1	Radar speed constant	Shows and permits change to the constant, Pulses Per Unit (meter / feet)
3. 1. 3. 2	Radar practical	Preferred method. Do in field with tank half full for most accurate result
3. 1. 3. 2. 1		Measure up a distance more than 70 meters or 200 feet. Then drive distance
3. 1. 3. 2. 2		Now key in the exact distance, measured by a measuring tape
3. 1. 3. 2. 3		This is the new constant (pulses per meter or feet)
3. 2	Flow calibration	Flow sensor calibration. Theoretical (PPU), Nozzle Tank method PrimeFlow
3. 2. 1	PPU theory method	EU: dia/ca PPU: Ø13/120, Ø20/60, Ø36/17 US: dia/ca PPU: Ø13/485, Ø20/225, Ø36/60
3. 2. 2	Nozzle method	Practical flow calibration, by checking the actual nozzle output per minute
3. 2. 2. 1	Nozzle method	measure the flow per minute from a number of nozzles. Press Enter.
3. 2. 2. 2	Nozzle method	Key in the averaged actual flow value and press Enter
3. 2. 2. 3	Nozzle method	This is the PPU constant from the volume previously just measured
3. 2. 2. 4	Open all sections	
3. 2. 2. 5	Close end nozzles, Bi-jet nozzles	
3. 2. 3	Tank method	Practical flow calibration done by emptying over half the tank
3. 2. 3. 1	Tank method	The sprayed amount is counted up when the sections are opened
3. 2. 3. 2	Tank method	Press Enter. The shown volume is adjusted to match the actual volume
3. 3	Boom setup	Boom width, number of sections and number of nozzles for each section
3. 3. 1	Width	The total spray boom width. Include end nozzles if fitted
3. 3. 2	Number of sections	The number of spray boom sections. Key in, then press Enter
3. 3. 3	Nozzles / sections	To set up no. of nozzles per section. Screens for each section will appear
3. 3. 3. 01	Section 1	Use arrow keys or numeric keys, then press Enter to set up section 1
3. 3. 3. 02	Section 2	Use arrow keys or numeric keys, then press Enter to set up section 2
3. 3. 3. 03	Section 3	Use arrow keys or numeric keys, then press Enter to set up section 3
3. 3. 3. 04	Section 4	Use arrow keys or numeric keys, then press Enter to set up section 4
3. 3. 3. 05	Section 5	Use arrow keys or numeric keys, then press Enter to set up section 5
3. 3. 3. 06	Section 6	Use arrow keys or numeric keys, then press Enter to set up section 6
3. 3. 3. 07	Section 7	Use arrow keys or numeric keys, then press Enter to set up section 7
3. 3. 3. 08	Section 8	Use arrow keys or numeric keys, then press Enter to set up section 8
3. 3. 3. 09	Section 9	Use arrow keys or numeric keys, then press Enter to set up section 9
3. 3. 3. 10	Section 10	Use arrow keys or numeric keys, then press Enter to set up section 10
3. 3. 3. 11	Section 11	Use arrow keys or numeric keys, then press Enter to set up section 11
3. 3. 3. 12	Section 12	Use arrow keys or numeric keys, then press Enter to set up section 12
3. 3. 3. 13	Section 13	Use arrow keys or numeric keys, then press Enter to set up section 13
3. 3. 4	End nozzles and Bi-jet nozzles	If end nozzles are fitted. Set value to equivalent coverage by boom nozzles
3. 3. 4. 1	None	If no end nozzles or Bi-jet nozzles are fitted, select this
3. 3. 4. 2	End nozzles fitted	Select if end nozzles are fitted
3. 3. 4. 2. 1	End nozzles	Key in 'n', number of regular nozzles equivalent to the end nozzle coverage
3. 3. 4. 3	Bi-jet fitted	Select if Bi-jet nozzles are fitted
3. 3. 4. 3. 1	Bi-jet end nozzles	
3. 3. 5	Length hitch to axle for ASC	Length from hitch to axle on sprayer for AutoSectionControl for ISObus
3. 3. 6	Length axle to boom for ASC	Length from axle on sprayer to boom for AutoSectionControl for ISObus
3. 4	Regulation user setup	Setup of pressure filter, nozzle, ASC default
3. 4. 1	Flow sensor restriction	Flow to obtain 1 bar (15 psi) pressure drop over pressure filter and flow sensor
3. 4. 2	Simulated speed value	Type in speed for priming at stand still and when both flow and pressure are defect
3. 4. 3	Nozzle size flow at 3 bar (45 psi)	0075Pink = 0.3 02Yellow = 0.8 04Red = 1.6 08White = 3.2 l/min
3. 4. 4	Dual line second nozzle	0075Pink = 0.3 02Yellow = 0.8 04Red = 1.6 08White = 3.2 l/min
3. 4. 5	Type of nozzle	Select Regular or QuintaStream nozzle
3. 4. 5. 1	Regular nozzle	Flat fan, Low drift, Minidrift
3. 4. 5. 2	QuintaStream	QuintaStream fertilizer nozzle
3. 4. 6	Regulation parameter	Code for special machines or applications, consult your dealer

3. 5	Tank gauge calibration	Setup density of chemical or fertilizer. Calibration for tank size and shape
3. 5. 1	Adjustment of specific gravity	Enter weight of liquid fertilizer divided by weight of water (e.g. 1.10 to 1.30)
3. 5. 2	Calibration of Tank gauge	Calibrate if factory calibration is not adequate. Disable SafeTrack
3. 5. 2. 1	Water level	Fill up the tank to the max level, then press Enter
3. 5. 2. 2	Water level	Level the sprayer, then press Enter
3. 5. 2. 3	Water level	Empty sprayer through main flow meter at boom. Computer will register flow
3. 5. 2. 4	Water level	Key in true volume from flowmeter. Computer will calculate table
3. 5. 3	Select factory calibration	Select preloaded factory calibration for Hardi® tanks or custom calibration
3. 5. 3. 1	Custom calibration of gauge	Tank gauge table from custom Calibration
3. 5. 3. 2	CME 3300 factory calibration	Factory tank gauge table for CME 3300
3. 5. 3. 3	CME 4500 factory calibration	Factory tank gauge table for CME 4500
3. 5. 3. 4	CME 7000 factory calibration	Factory tank gauge table for CME 7000
3. 5. 3. 5	CME 9000 factory calibration	Factory tank gauge table for CME 9000 AUS
3. 5. 3. 6	Alpha 2500 factory calibration	Factory tank gauge table for Alpha 2500
3. 5. 3. 7	Alpha 3500 factory calibration	Factory tank gauge table for Alpha 3500
3. 5. 3. 8	Alpha 4100 factory calibration	Factory tank gauge table for Alpha 4100
3. 5. 3. 9	Alpha 3000 factory calibration	Factory tank gauge table for Alpha 3000
3. 5. 3. 10	CME 5x00 factory calibration	Factory tank gauge table for CME 5x00 AUS
3. 5. 3. 11	CME 7x00 factory calibration	Factory tank gauge table for CME 7x00 AUS
3. 5. 3. 12	Saritor 4000 factory cal	Factory tank gauge table for Saritor 4000
3. 5. 3. 13	Saritor 5000 factory cal	Factory tank gauge table for Saritor 5000
3. 5. 3. 14	Navigator 3000 factory cal	Factory tank gauge table for Navigator 3000
3. 5. 3. 15	Navigator 4000 factory cal	Factory tank gauge table for Navigator 4000
3. 5. 3. 16	CME 5500 factory cal	Factory tank gauge table for CME 5500 EU US
3. 5. 3. 17	CME 10,000 factory cal	Factory tank gauge table for CME 10,000
3. 5. 3. 18	Navigator 5000 factory cal	Factory tank gauge table for Navigator 5000
3. 5. 3. 19	Navigator 6000 factory cal	Factory tank gauge table for Navigator 6000
3. 5. 3. 20	Presidio 2700 factory cal	Factory tank gauge table for Presidio 2700 EU US
3. 5. 4	Offset at empty MainTank	Actual frequency. Accept if empty. Or key in recorded empty-frequency
3. 5. 4. 1	TankGauge Offset,	
3. 6	Track calibration	Track width, tractor drawbar length, damping, alignment, sensitivity set up
3. 6. 1	Track width	Track width of the sprayer wheels measured center to center
3. 6. 2	Tractor drawbar	Tractor drawbar length is length from tractor rear axle to pin-bolt
3. 6. 3	Dead zone for regulation	Increase for high speed. Decrease for high accuracy
3. 6. 4	Damping of hydraulics	Increase for smooth drive and high speed. Decrease for high accuracy
3. 6. 5	Align offset + right - left	Alignment of sprayer. Positive value moves sprayer right, negative left
3. 6. 6	Calibrate sensitivity	Adjustment of track sensitivity in relation to the tractor hydraulics
3. 6. 6. 01	Sensitivity tractor hydraulic	Press ESC to abort. Press Enter to start calibration of offset and gain
3. 6. 6. 02	Finding offset right side	Press hold 'steer to right' button. Computer will activate valve to find offset
3. 6. 6. 03	Offset right side is Ok	
3. 6. 6. 04	Finding offset right failed	Press Enter to return to Track calibration menu
3. 6. 6. 05	Finding offset left side	Press hold 'steer to left' button. Computer will activate valve to find offset
3. 6. 6. 06	Offset left side is Ok	
3. 6. 6. 07	Finding offset left failed	Press Enter to return to Track calibration menu
3. 6. 6. 08	Finding gain right side	Press hold 'steer to right' button. Computer will activate valve and find gain
3. 6. 6. 09	Gain right side is Ok	
3. 6. 6. 10	Find gain right side failed	Press Enter to return to Track calibration menu
3. 6. 6. 11	Finding gain left side	Press hold 'steer to left' button. Computer will activate valve and find gain
3. 6. 6. 12	Gain left side is Ok	Calibration is OK. Press Enter to return to Track calibration menu
3. 6. 6. 13	Finding gain left side failed	Press Enter to return to Track calibration menu
3. 6. 6. 14	Stop driving	Stop driving
3. 6. 6. 15	Switch to auto	Switch to auto track

4	Toolbox	Helpful tools e.g. measure distance and area, service intervals, test etc
4. 1	Measure	To measure distance and area. Setup working width
4. 1. 1	Measure Distance	This is a simple electronic 'measuring tape'. You can measure distance
4. 1. 1. 1	Measure Distance	Measure stopped. Press C to clear, Enter to start and ESC to exit

4. 1. 1. 2	Measure Distance	Measure started. Press Enter to stop and ESC to exit
4. 1. 2	Measure Area	If the implement width is Entered, area can also be measured
4. 1. 3	Setup working width	Key in the implement working width
4. 1. 4	Stop-watch	The clock can be used as a stop watch
4. 1. 4. 1	Stopwatch: Not active	Press C to clear. Press Enter to start, Esc to exit
4. 1. 4. 2	Stopwatch: Active	Press Enter to stop and edit. Press Esc to exit. Stopwatch will continue
4. 1. 5	Alarm clock	The clock can be set as an alarm clock
4. 1. 5. 1	Alarm clock: Not active	Key in time. Press C to clear. Press Enter to start. Press ESC to exit.
4. 1. 5. 2	Alarm clock: Active	Press Enter to stop and edit. Press Esc to exit. Alarm clock will continue
4. 2	Service interval: Hours until	Work hours remaining for each part until next service is recommended
4. 2. 1	10 hrs Check filters	
4. 2. 2	50 hrs Grease boom	
4. 2. 3	250 hrs Grease center	
4. 2. 4	Misc. service	
4. 2. 5	10 hrs Check nozzles	
4. 3	Service interval reset	Reset timer counter when service has been carried out
4. 3. 1	Check filters reset	Press Enter to reset hour counter, ESC to leave unchanged
4. 3. 2	Grease boom reset	Press Enter to reset hour counter, ESC to leave unchanged
4. 3. 3	Grease track and center	Press Enter to reset hour counter, ESC to leave unchanged
4. 3. 4	Miscellaneous service	Press Enter to reset hour counter, ESC to leave unchanged
4. 3. 5	Check nozzles	Press Enter to reset hour counter, ESC to leave unchanged
4. 4	Reserved	R R
4. 5	Test of sensors	Test screens for buttons, sensor readings PrimeFlow status Valve friction
4. 5. 1	Flow Speed Optional sensors	Activate function to monitor sensor (e.g. drive forwards, start flow)
4. 5. 1. 1	Pressure	
4. 5. 1. 2	Fan Speed	
4. 5. 1. 3	Tank gauge	
4. 5. 1. 4	Boom sensor	
4. 5. 1. 5	Pressure regulation feedback	
4. 5. 1. 6	Flow	
4. 5. 1. 7	Speed	
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. 2. 1	Keys on Terminal	
4. 5. 2. 2	Keys on SetBox	
4. 5. 2. 3	Keys on Grip	
4. 5. 2. 4	Keys on FluidBox	
4. 5. 3	PrimeFlow test	PrimeFlow test for nozzles and PrimeFlow computers on boom
4. 5. 3. 1 to 125	PrimeFlow computer status	Press Arrow DOWN to see next SMCU Arrow UP to see previous
4. 5. 3. 1. 1	Total SMCU's	
4. 5. 3. 1. 2	Total nozzles	
4. 5. 3. 1. 3	This SMCU position	
4. 5. 3. 1. 4	Nozzle order	
4. 5. 3. 1. 5	Nozzle no short cab.	
4. 5. 3. 1. 6	Nozzle medium cable	
4. 5. 3. 1. 7	Nozzle no long cable	
4. 5. 3. 1. 8	Count of data error	
4. 5. 3. 1. 9	Count of power error	
4. 5. 4	Input test	See computer readings of sensors Frequency, switch, analog inputs
4. 5. 4. 1	Frequency 1 Speed, Flow	Test of frequency input sensors: Speed, Flow, Tank gauge, Fan
4. 5. 4. 1. 1	Speed	
4. 5. 4. 1. 2	Flow to sections	
4. 5. 4. 1. 3	Flow from rinse tank	
4. 5. 4. 1. 4	FlexCap pump RPM	
4. 5. 4. 1. 5	Tank gauge	
4. 5. 4. 1. 6	Wind Speed	
4. 5. 4. 1. 7	Fan speed	
4. 5. 4. 1. 8	PTO pump RPM	

4. 5. 4. 1. 9	Speed to terminal	
4. 5. 4. 2	Freq. 2 input Extra	Test of frequency 2 sensors: Extra Regulation, agitation valve
4. 5. 4. 2. 1	Regulation valve	
4. 5. 4. 2. 2	Agitation valve	
4. 5. 4. 2. 3	Boom folded Left	
4. 5. 4. 2. 4	Boom folded Right	
4. 5. 4. 3	Switch on/off inputs	Test Switch inputs function 0 equals connected, 1 equals open
4. 5. 4. 3. 1	Pendulum lock	
4. 5. 4. 3. 2	Ladder up	
4. 5. 4. 3. 3	HY interface error	
4. 5. 4. 3. 4	SmartValve switch	
4. 5. 4. 3. 5	Main tank float	
4. 5. 4. 3. 6	Rinse tank float	
4. 5. 4. 3. 7	12V relay DAH box	
4. 5. 4. 3. 8	Foot Switch terminal	(HC6500 only)
4. 5. 4. 4	Analog 1 inputs Boom	Test Analog 1 sensors on boom: Slant, Height, Tilt, Foam, TWIN
4. 5. 4. 4. 1	Slant	
4. 5. 4. 4. 2	Boom height	
4. 5. 4. 4. 3	PF bus +	
4. 5. 4. 4. 4	PF bus -	
4. 5. 4. 4. 5	Foam blob distance	
4. 5. 4. 4. 6	TWIN angle	
4. 5. 4. 4. 7	TWIN fan r/min	
4. 5. 4. 4. 8	Agitation angle	
4. 5. 4. 4. 9	Reg. valve angle	
4. 5. 4. 5	Analog 2 inputs Extra	Test Analog 2 sensors: Electric smart valves, extra
4. 5. 4. 5. 1	Distance center	
4. 5. 4. 5. 2	PrimeFlow volt left	
4. 5. 4. 5. 3	PrimeFlow volt right	
4. 5. 4. 5. 4	Dynamic center pos.	
4. 5. 4. 5. 5	Lock sensor	
4. 5. 4. 5. 6	Pendulum lock	
4. 5. 4. 5. 7	Suction SV potmeter	
4. 5. 4. 5. 8	Press. SV potmeter	
4. 5. 4. 5. 9	Fill valve potmeter	
4. 5. 4. 6	Track sensor test	Actual sensor signals Under 0.5 volt means not connected
4. 5. 4. 6. 1	Front sensor	
4. 5. 4. 6. 2	Front sensor	
4. 5. 4. 6. 3	Rear sensor	
4. 5. 4. 6. 4	Rear sensor	
4. 5. 4. 6. 5	Boom sensor 1	
4. 5. 4. 6. 6	Boom sensor 1	
4. 5. 4. 6. 7	Boom sensor 2	
4. 5. 4. 6. 8	Lock sensor	
4. 5. 4. 6. 9	Lock sensor	
4. 5. 4. 7	SafeTrack sensitivity view	Higher offset higher current to open Higher gain mean more oil at current
4. 5. 4. 7. 1	Left offset value	
4. 5. 4. 7. 2	Right offset value	
4. 5. 4. 7. 3	Left gain factor	
4. 5. 4. 7. 4	Right gain factor	
4. 5. 4. 8	Twin boom fold sensors	Status=1 is 5 volt or not connected Under 0.5 volt is not connected
4. 5. 4. 8. 1	L outer boom transp.	
4. 5. 4. 8. 2	L outer boom spray	
4. 5. 4. 8. 3	R outer boom transp.	
4. 5. 4. 8. 4	R outer boom spray	
4. 5. 4. 9	Speed, Pumps RPM mounting	Duty cycle indicate distance 70% = too close 20%= too far away
4. 5. 4. 9. 1	Speed	

4. 5. 4. 9. 2	Speed duty cycle 1	
4. 5. 4. 9. 3	Speed duty cycle 2	
4. 5. 4. 9. 4	Speed max duty cycle	
4. 5. 4. 9. 5	Speed min duty cycle	
4. 5. 4. 9 6	PTO pump RPM	
4. 5. 4. 9. 7	PTO pump duty cycle	
4. 5. 4. 9. 8	FlexCap pump freq.	
4. 5. 4. 9. 9	FlexCap duty cycle	
4. 5. 5	Fluid and valve test	Test of regulation and electric valves
4. 5. 5. 1	Show SmartValve friction	Turn time increase with friction. Limit 900 msec to 1300msec. C to clear
4. 5. 5. 1. 1	Suct valve avr CW	
4. 5. 5. 1. 2	Suct valve avr CCW	
4. 5. 5. 1. 3	PressurValve avr CW	
4. 5. 5. 1. 4	PressurValve avr CCW	
4. 5. 5. 1. 5	FastF.Valve avr CW	
4. 5. 5. 1. 6	FastF.Valve avr CCW	
4. 5. 5. 2	Regulation sensors	Details for regulation sensor inputs Boom pressure Flow Pump RPM
4. 5. 5. 2. 1	Boom pressure	
4. 5. 5. 2. 2	Boom flow sensor	
4. 5. 5. 2. 3	Pump RPM	
4. 5. 5. 2. 4	FlexCapacity RPM	
4. 5. 5. 2. 5	Reg. valve sensor	
4. 5. 5. 2. 6	Agt. valve sensor	
4. 5. 5. 2. 7	Reserved	
4. 5. 5. 2. 8	Reserved	
4. 5. 5. 2. 9	Regulator state	
4. 5. 5. 3	Flow calculations	Check flow calculations are realistic with current settings of sprayer
4. 5. 5. 3. 1	Boom pressure	
4. 5. 5. 3. 2	Agitation calc press	
4. 5. 5. 3. 3	Pump calc flow	
4. 5. 5. 3. 4	Agit valve calc flow	
4. 5. 5. 3. 5	Reg valve calc flow	
4. 5. 5. 3. 6	Boom flow sensor	
4. 5. 5. 3. 7	Nozzle SizeQ 3bar A	
4. 5. 5. 3. 8	Nozzle SizeQ 3bar B	
4. 5. 5. 3. 9	Nozzle SizeQ 3bar AB	
4. 5. 5. 4	RS232(COM1) serial test	Inactive, No connection, No data, Wrong CRC, Unsupported command, Valid data
4. 5. 5. 4. 1	COM1 near bracket	
4. 5. 5. 4. 2	Signal detec on port	
4. 5. 5. 4. 3	Valid telegram	
4. 5. 5. 4. 4	Wrong baud rate	
4. 5. 5. 4. 5	Overrun error	
4. 5. 5. 4. 6	CRC err acc. to spec	
4. 5. 5. 4. 7	Unsupported telegram	
4. 5. 5. 5	RS232(COM2) serial test	Inactive, No connection, No data, Wrong CRC, Unsupported command, Valid data
4. 5. 5. 5. 1	COM2 near edge	
4. 5. 5. 5. 2	Signal detec on port	
4. 5. 5. 5. 3	Valid telegram	
4. 5. 5. 5. 4	Wrong baud rate	
4. 5. 5. 5. 5	Overrun error	
4. 5. 5. 5. 6	CRC err acc. to spec	
4. 5. 5. 5. 7	Unsupported telegram	
4. 5. 5. 6	Extra reg. diagnose	Saritor hydraulic valve
4. 5. 5. 6. 1	Hydr. valve offset	
4. 5. 5. 6. 2	Hydr. valve slope	
4. 5. 5. 6. 3	Hydr. valve hysteres	
4. 5. 5. 7	EVC reg. diagnose	EVC regulation diagnose

4. 5. 5. 7. 1	Boom flow sensor	
4. 5. 5. 7. 2	EVC change deviation	
4. 5. 5. 7. 3	Reg V. end to end T.	
4. 5. 5. 8	JobCom voltage monitor	12 V battery 5 V sensor max min hold
4. 5. 5. 8. 1	12 V battery max	
4. 5. 5. 8. 2	12 V battery min	
4. 5. 5. 8. 3	5 V battery max	
4. 5. 5. 8. 3	5 V battery min	
4. 5. 6	PrimeFlow SMCU status	See nozzle position, nozzle order, counts of data error power error
4. 5. 6. 1	First nozzle for SMCU	Position of first nozzle on boom counted from left
4. 5. 6. 2	SMCU 2 or 3 nozzle	Produced or reprogrammed. SMCU with 3 cables could be changed to 2 nozzles
4. 5. 6. 3	Nozzle order	Show --- when connected in normal order Short Medium Long from left -
4. 5. 6. 4	Count of data error	Times were SMCU did not respond to alive telegram. C to reset counters
4. 5. 6. 5	Count of power error	Times were SMCU shot down due to low voltage. C to reset counters
4. 5. 6. 6	SMCU version	View SMCU versions
4. 5. 7	PrimeFlow motor status	
4. 5. 7. 1	Motor 1-90 disconnect	Motor or connector disconnected Press C to reset
4. 5. 7. 2	Motor 91-180 disconnect	Motor or connector disconnected Press C to reset
4. 5. 7. 3	Motor 1-90 shorted	Motor or connector short circuited Press C to reset
4. 5. 7. 4	Motor 91-180 shorted	Motor or connector short circuited Press C to reset
4. 5. 7. 5	Motor 1-90 blocked	Motor connection ok, but motor cannot move. Press C to reset
4. 5. 7. 6	Motor 91-180 blocked	Motor connection ok, but motor cannot move. Press C to reset
4. 6	Speed simulation	Key in speed value. To disable simulation key in 0 or power off
4. 7	Emergency	
4. 7. 1	Track align	Emergency only. Align sprayer and fold boom, in case a sensor is defect
4. 7. 1. 1	Front sensor	
4. 7. 1. 2	Front sensor	
4. 7. 1. 3	Rear sensor	
4. 7. 1. 4	Rear sensor	
4. 7. 1. 5	Boom sensor 1	
4. 7. 1. 6	Boom sensor 1	
4. 7. 1. 7	Lock sensor	
4. 7. 1. 8	Lock sensor	
4. 7. 1. 9	SafeTrack mode	
4. 7. 2	Boom fold	Emergency only. Manual lock and fold boom, in case a sensor is defect
4. 7. 2. 1	Dynamic center pos.	
4. 7. 2. 2	Dyn. center	
4. 7. 2. 3	Pendulum lock	
4. 7. 2. 4	Pend. unlock	
4. 7. 2. 5	Boom sensor 1	
4. 7. 2. 6	Boom sensor 1	
4. 7. 2. 7	Boom height status	
4. 7. 2. 8	Boom height	
4. 7. 2. 9	Boom hydraulics	
4. 8	Computer CAN status	Menus for a diagnostic system check. Counter of errors. SW HW versions
4. 8. 1	Operating status all computer	Computer detail screens show details in case of faults
4. 8. 1. 1	Terminal HC 6500	
4. 8. 1. 2	JobCom HC 6100	
4. 8. 1. 3	Grip HC 6300	
4. 8. 1. 4	SetBox HC 6400	
4. 8. 1. 5	FluidBox HC 6200	
4. 8. 2	Software versions all computer	Computer detail screens show details in case of faults
4. 8. 2. 1	JobCom HC 6100	
4. 8. 2. 2	Grip HC 6300	
4. 8. 2. 3	SetBox HC 6400	
4. 8. 2. 4	FluidBox HC 6200	
4. 8. 3	Hardware versions all computer	Computer detail screens show details in case of faults

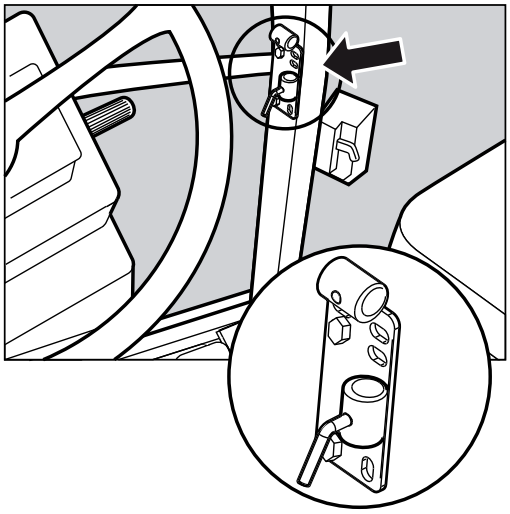
4. 8. 3. 1	JobCom HC 6100	
4. 8. 3. 2	Grip HC 6300	
4. 8. 3. 3	SetBox HC 6400	
4. 8. 3. 4	FluidBox HC 6200	
4. 8. 4	Work status Terminal HC 6500	Faults occurred Press C key to reset counters
4. 8. 4. 1	Terminal HC 6500	
4. 8. 4. 2	JobCom HC 6100	
4. 8. 4. 3	Grip HC 6300	
4. 8. 4. 4	SetBox HC 6400	
4. 8. 4. 5	FluidBox HC 6200	
4. 8. 4. 6	Internal HW error	
4. 8. 5	Work status JobCom HC 6100	Faults occurred Press C key to reset counters
4. 8. 5. 1	CANbus short circuit	
4. 8. 5. 2	CAN bus open circuit	
4. 8. 5. 3		
4. 8. 5. 4	Watchdog reset	
4. 8. 5. 5	Cannot logon	
4. 8. 5. 6	Data missing	
4. 8. 5. 7	Receive data invalid	
4. 8. 5. 8	CAN bus overflow	
4. 8. 5. 9	Max. used stack	
4. 8. 6	Work status Grip HC 6300	Faults occurred Press C key to reset counters
4. 8. 7	Work status SetBox HC 6400	Faults occurred Press C key to reset counters
4. 8. 8	Work status FluidBox HC 6200	Faults occurred Press C key to reset counters

5	Logbook	Data records of registers or configuration for print or dump
5. 1	Print	Register and configuration can be printed to the 12 volt printer
5. 1. 1	Print single register	A specific register is selected for a Print
5. 1. 1. 1		Key in number of specific register to print. Press Enter to start printing
5. 1. 1. 2		Bytes printed at 9600 8-N-1 baud. Press ESC to cancel
5. 1. 2	Print all registers	Registers in use will be printed. Print starts upon key press on Enter
5. 1. 3	Print configuration	Records all system parameters. Print starts upon key press on Enter
5. 1. 4	Print PrimeFlow status	Print status for all computer. Print starts upon key press on Enter
5. 1. 4. 1		Printing. Press ESC to abort
5. 1. 5	Print PrimeFlow motor status	Print status for all motors
5. 1. 5. 1		Printing. Press ESC to abort
5. 2	Data dump	Register and configuration can be dumped to a PC via e.g. Hyper Terminal
5. 2. 1	Data dump of raw data	Transmits data from all 99 registers in comma-separated file for Excel
5. 2. 2	Hyperterminal service report	Transmits to PC at high speed Configuration ErrorLog Track PrimeFlow

Tractor installation

Installation of control unit brackets

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.



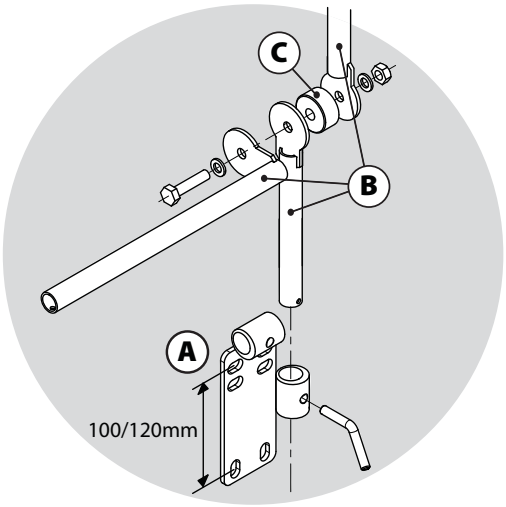
The supplied tractor pillar bracket (A) has a hole spacing of 3.9 in. (100 mm) and 4.7 in. (120 mm) and will fit most tractors. Threaded mounting holes may be hidden behind front corner cover.

ATTENTION! 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 all boxes will line up if correctly oriented.

The recommended setup is to place the spacer (C) between the two tubes (B) used for the controllers and the 3rd tube (B) as shown in the picture, so it can be mounted in the bracket (A).



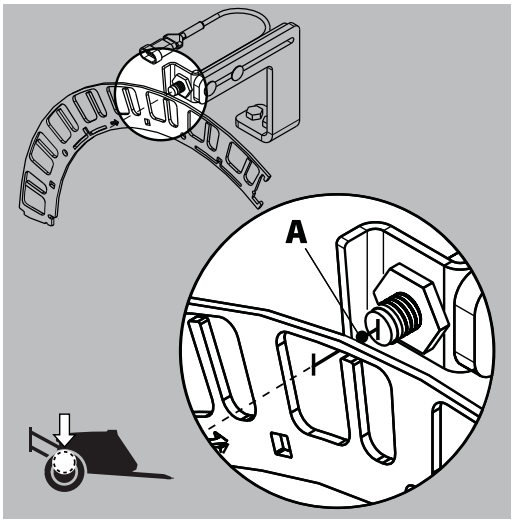
Printer

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

ATTENTION! The Controller 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 sprayer's right wheel. It is an inductive type that requires a metallic protrusion to pass by it to trigger a signal. A speed ring is used to trigger the transducer. It should be adjusted so the transducer is placed in the center of the holes in the speed ring (vertical direction). Recommended distance between protrusion and transducer (A) is 1/8" to 1/4" (3 to 6 mm). Check throughout the entire circumference. Correct adjustment is indicated by a constant blinking from the transducer when the wheel rotates.



How to set clock

If time or date is out of adjustment, it can be corrected as follows.

ATTENTION! This must be done at very first start-up, when prompted. If no prompt, the HARDI® dealer may have done this.

1. Press {Enter} on ISOBUS Terminal.
2. Press {down} arrow to menu [2 Setup]. Press {Enter}.
3. Press {down} arrow to menu [2.4 Set clock]. Press {Enter}.
4. Press {Enter} to enter first submenu, menu [2.4.1 Time format (12 or 24 hour)].
5. By using {up} or {down} arrows you can choose between:

   Menu [2.4.1.1 12 hour format].

   Menu [2.4.1.2 24 hour format].
6. Press {Enter} to select format and return to previous menu by pressing {ESC}.
7. Press {down} arrow to menu [2.4.2 Set time].
8. Press {Enter} and select minutes or hours, then enter value with numeric keys.
9. Press the check mark to confirm.
10. Press {down} arrow to menu [2.4.3 Set date and month].
11. Press {Enter} and select day or month, then enter value with numeric keys.
12. Press the check mark to confirm.
13. Press {down} arrow to menu [2.4.4 Set year].
14. Press {Enter} and select year, then enter value with numeric keys.
15. Press the check mark to confirm.
16. Press {ESC} to exit menu.

Initial settings

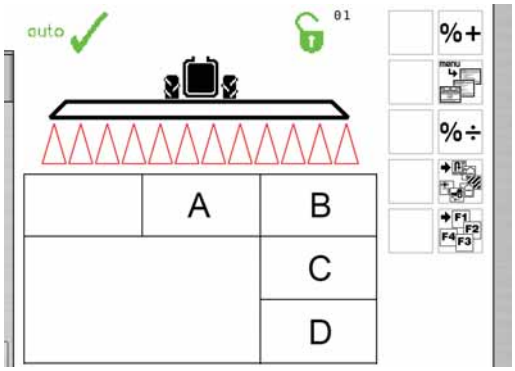
System start-up

When turned ON:

- The system initiates itself.
- If the system is put into operation for the very first time it will prompt for date and time. Set clock to enable register. Refer to "How to set clock" on page 4.2 for details on setting of clock.

Display readout

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



ATTENTION! Read more about difference between HC 6500 and ISOBUS in "Menu 2.1 Display readout" on page 6.1.

Readout selection

1. Go to menu [2.1 Display readout].
2. Use {up} or {down} arrows to choose which of following boxes you want the data shown and press {Enter} to confirm.

   2.1.1 Show upper middle (A)

   2.1.2 Show upper right (B)

   2.1.3 Show lower middle (C)

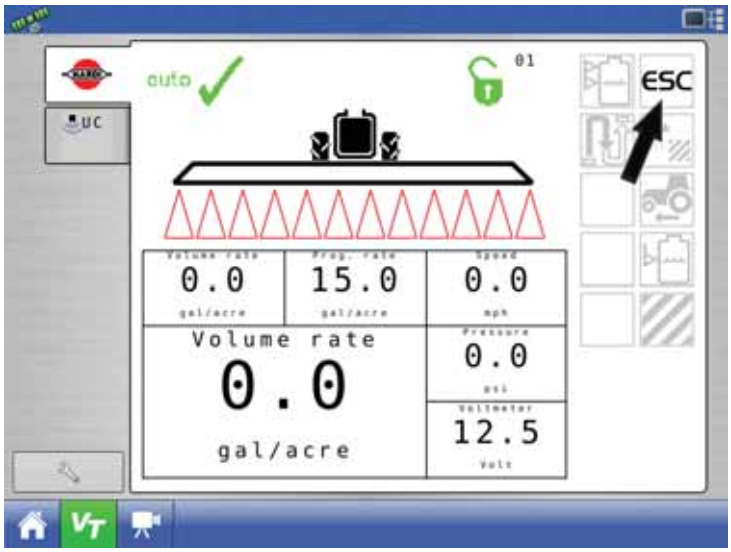
   2.1.4 Show lower right (D)
3. Choose a submenu e.g. menu [2.1.1.04 Work rate]. Press {Enter} to confirm.
4. Press {ESC} to leave menu.

ATTENTION! For a full list of possible readouts, please refer to menu 2.1.1, menu 2.1.2, menu 2.1.3 and menu 2.1.4 in "Full menu structure" on page 3.15.

ESC key for ISOBUS terminals

Menu 2.1.5 changes how the ESC key is operated.

- Menu 2.1.5.1 "Show ESC as softkey": Select this menu if there is no ESC button on the ISOBUS terminal.
- Menu 2.1.5.2 "Do not show ESC as softkey": Select this menu if the ISOBUS terminal has a physical ESC button.



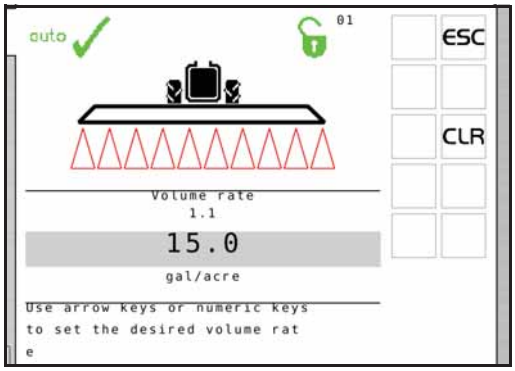
ATTENTION! If the ESC softkey is removed on a display without a physical ESC button, navigation will become impossible and will require service to fix. Only select menu 2.1.5.2 if a physical ESC button exists.

Working in the field

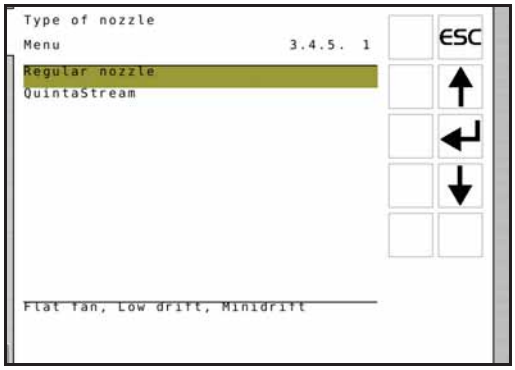
Set up before spray job

The following steps are to be taken to set up the sprayer before beginning a spray job.

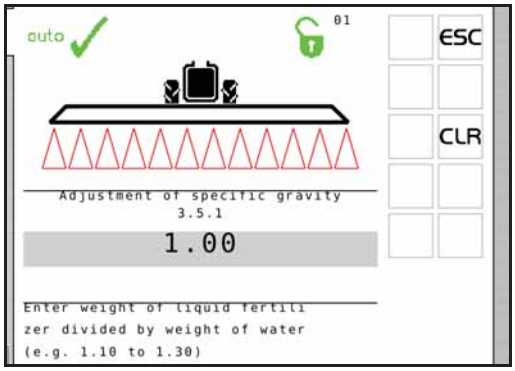
1. Set the volume rate for the present spray job.



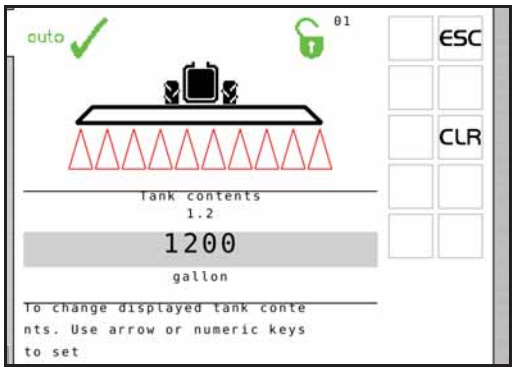
2. Select the nozzle type to be used for normal spray or fertilizer spraying.



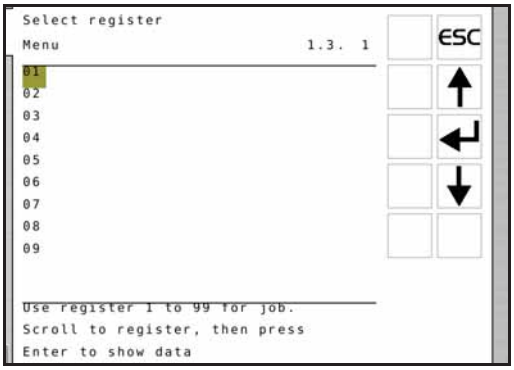
3. Adjust specific gravity when changing between a normal spray job and fertilizer spraying.



4. If the sprayer is not equipped with Tank Gauge, then type in the contents filled into the main tank.

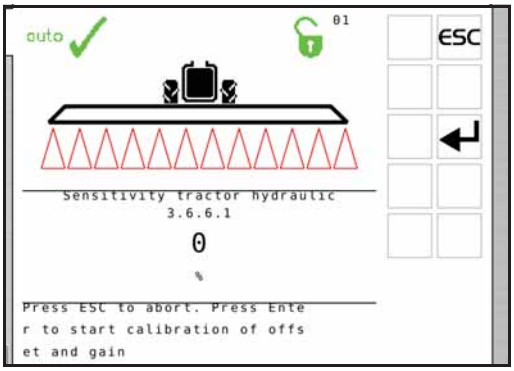


5. Select register for the present spray job (if desired).



6. For SafeTrack, the sensitivity of the tractor hydraulic must be calibrated. Follow the instructions written in the bottom of the display.

NOTE! The calibration can only be done with the boom unfolded!



Volume rate

NOTE! When used on an HC 9500 ISOBUS terminal, the volume rate must be set in the HC 9500 software when its graphical field functions are used (not running Virtual Terminal only). In such case, please refer to the HC 9500 instruction book for set up of volume rate.

If running Virtual Terminal only on a HC 9500 the following procedure applies.

The volume rate can be changed by

- Setting the desired rate in the Controller.
- Manually raising or lowering the pressure via the SetBox.
- Pressing {%-up} or {%-down} 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

Go to menu [1.1 VOLUME RATE] to read volume rate

To change volume rate

1. Go to menu [1.1 VOLUME RATE].
2. Change the value. Alternatively clear value by pressing Clear and key in value on the numeric keys.
3. Press Enter to confirm.

Manual dosage

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

To go from manual to preset volume rate, press AUTO.

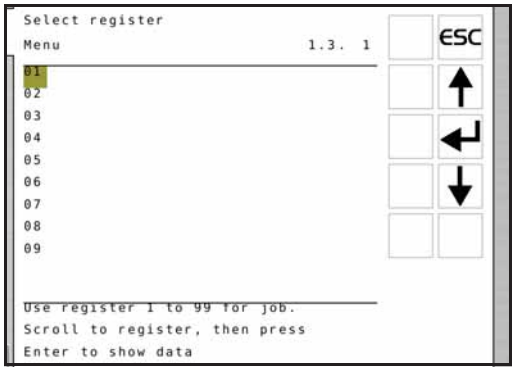
ATTENTION! Under 0.3 mph (0.5 km/h), the Controller will not regulate automatically.

4 - System setup

Register readout and selection

Registers are identified with a number. The data is saved when the system is switched off.

- Register 1 to 98 can be used for individual areas.
- Register 99 is a tally of register trips 1 to 98.



To read the totals of all registers:

1. Go to menu [1.3 Select register].
2. Go to register 99.
3. Press Enter to enter the register and read main data.
4. Press Enter again to see spray data.
5. Press Escape to exit the menu.

To read the data in the active register:

1. Go to menu [1.3 Select register].
2. Press Enter to enter register and read main data.
3. Press Enter again to see spray data.
4. Press Escape to exit the menu.

To change the register:

1. Go to menu [1.3 Select register].
2. Press up or down arrow to change the register.
3. Press Enter. If necessary, the register can be reset - see below.
4. Press Escape to exit the menu.

To reset register:

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

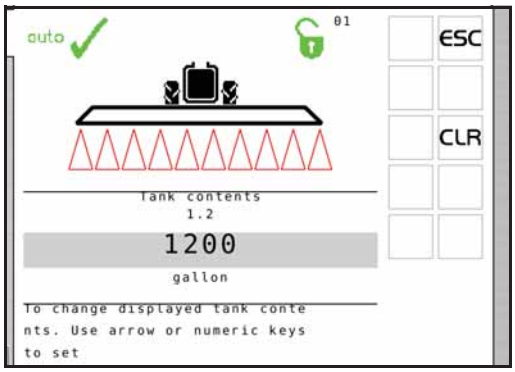
Reset of a register can be stopped if the Escape key is released before the status diode is blinks again.

ATTENTION! The active register number is always visible in the right upper corner of the display.

Tank contents

To change the displayed tank contents:

1. Go to menu [1.2 Tank contents].
2. Set the value.
3. Press Enter to confirm.
4. The maximum size of the tank is displayed.



ATTENTION! If the sprayer is fitted with Tank gauge, contents readout is automatic.

TWIN Preset

Air volume and air angle can be set in 2 different positions:

- Headwind
- Tail wind

Store manual preset

1. Set air volume and air angle for headwind.
2. Press a long key press at button for position 1 on the grip to store the present setting.
3. Do the same setting for position 2 tailwind.

Store auto preset

TWIN preset can be setup so it will shift automatically from position 1 to position 2 when the main ON/OFF is activated (menu 2.2.5 to 2.2.5.2).

Spraying with DynamicFluid4 pressure regulation

Start up procedure and steps done by the spray driver when beginning a spray job at the headland in the field is described below:

- The controller always starts up in automatic mode.
- If, by some reason, the ⊕ or ⊖ has been pressed, the controller enters manual mode. Then press auto before beginning any spraying.
- Do not adjust the pressure before and while spraying, as the controller does this automatically.

Regulation valve LED's

The regulation valve is equipped with 4 LED's as indication of valve status:

LED color	Valve status
2 x Red	Out of working range. The valve disc is out of its normal working range. This does not happen when the regulation valve works correctly. The software will prevent the valve from going out of range, also when manually operated.
Yellow	Valve closed. The valve disc is closed or starts to open, and is within the normal working range.
Green	Open and in work range. The valve disc is open and in its normal working range. This is normal state when spraying.

Spraying with FlexCapacity pump

On conventional P.T.O. systems, both the P.T.O. pump and the hydraulic FlexCapacity pump deliver constant flow when engaged. Therefore the spray pressure is controlled by the regulation valve when:

- Valves/sections are opened or closed.
- Speed is increased or decreased, etc.

When specific driving conditions or large nozzles makes the regulation valve unable to adjust to correct pressure because of too large or too low flow, i.e. regulation valve is completely open or closed, it requires the FlexCapacity pump to be turned ON/OFF - in general:

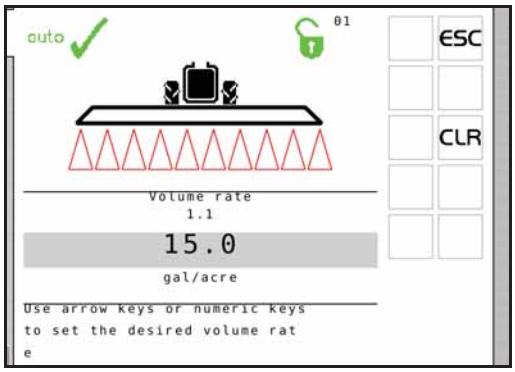
- Turn FlexCapacity pump ON when nozzle pressure gets too low. Controller prompts the warning “Increase pump flow”.
- Turn FlexCapacity pump OFF when nozzle pressure gets too high. Controller prompts the warning “Reduce pump flow”.

Menu 1 Daily settings

Menu 1.1 Volume rate

Volume rate, also called application rate, is the volume of fluid which passes through the nozzles per area unit. Volume rate is measured in gallons per acre.

Setting volume rate is described in “Volume rate” on page 4.5.

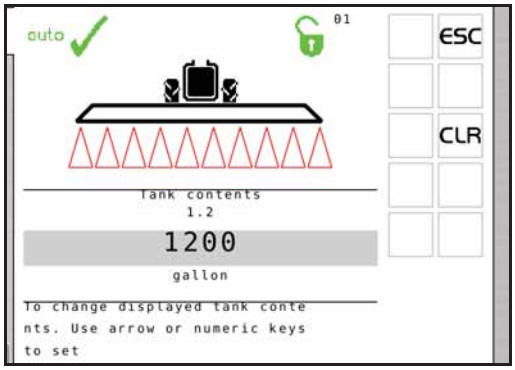


Menu 1.2 Tank contents

This menu is to enter tank contents if no tank gauge is fitted.

To set tank contents, see “Tank contents” on page 4.6.

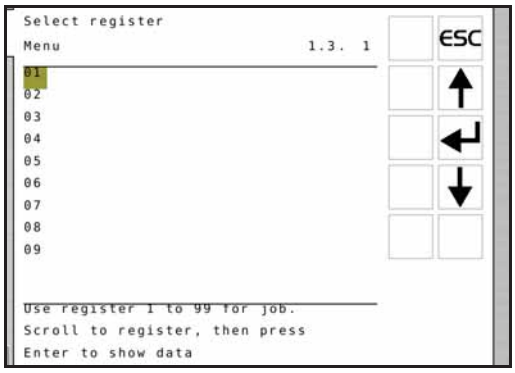
ATTENTION! If the sprayer is fitted with Tank gauge, contents readout is automatic.



Menu 1.3 Select register

- 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. The data is saved when the system is switched off.

ATTENTION! The active register number is always visible in the right upper corner of the display.



Menu 2 Setup

General info

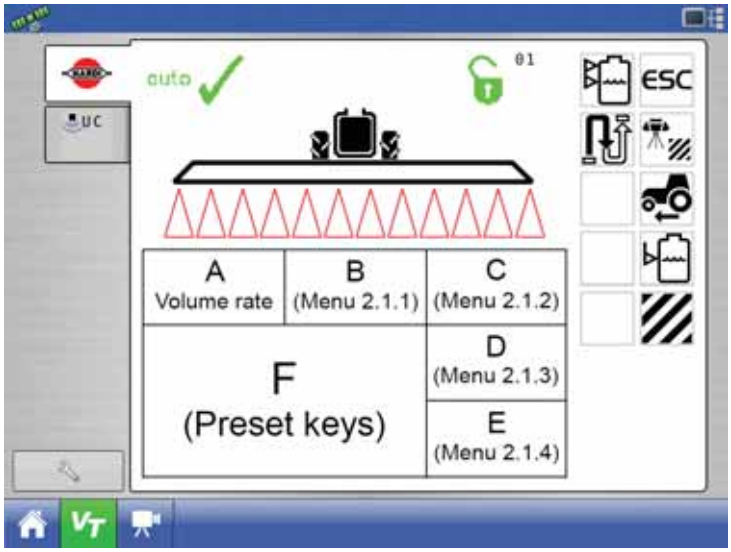
The following menu explanations assume you have mastered the general keystrokes and you can "find your way" to the specific menu. If this is not so, please re-read section "Terminals and boxes" on page 3.3.

Menu 2.1 Display readout

It is possible to freely choose which functions will be shown in the display. The ISOBUS terminals have 6 different boxes (A, B, C, D, E and F). Box A always displays the Volume rate. Boxes B - E display user selected information. Box F displays information selected from the preset keys (Volume sprayed, Distance left, Volume rate, Speed, Tank contents or Area sprayed).

A full list of possible readouts for boxes B - E can be found in the "Full menu structure" on page 3.15.

A. Volume rate
B. Selected with menu 2.1.1
C. Selected with menu 2.1.2
D. Selected with menu 2.1.3
E. Selected with menu 2.1.4
F. Selected with preset keys

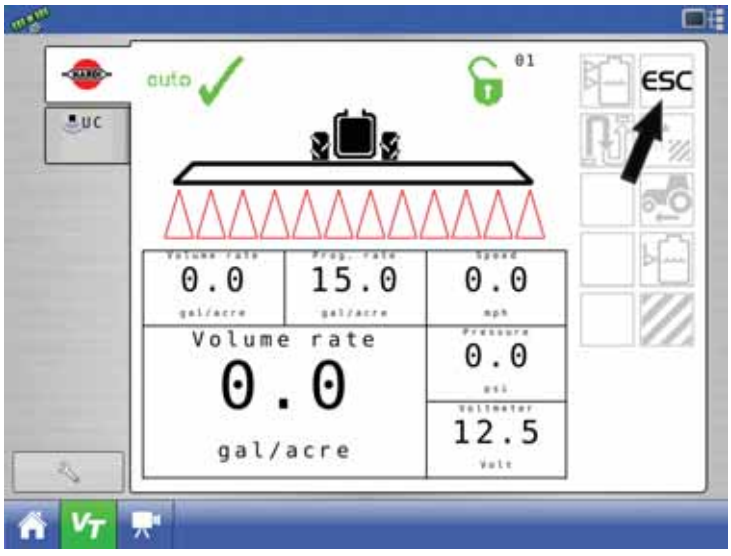


ATTENTION! As some readouts need extra sensors, the relevant sensor has to be connected to get a readout.

ESC key for ISOBUS terminals

Menu 2.1.5 changes how the ESC key is operated.

- Menu 2.1.5.1 "Show ESC as softkey": Select this menu if there is no ESC button on the ISOBUS terminal.
- Menu 2.1.5.2 "Do not show ESC as softkey": Select this menu if the ISOBUS terminal has a physical ESC button.



ATTENTION! If the ESC softkey is removed on a display without a physical ESC button, navigation will become impossible and will require service to fix. Only select menu 2.1.5.2 if a physical ESC button exists.

6 - Menu 2 Setup

Menu 2.2 Auto functions

In this menu, several automatic functions can be set up for specific use.

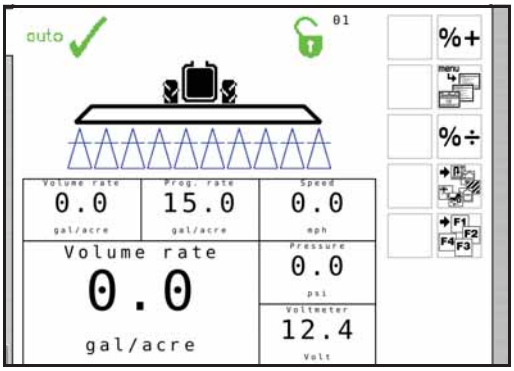
Menu 2.2.1 Main ON/OFF

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 function is active while the main ON/OFF switch and boom section switches are on, the boom status symbol will be blue with a bar across whenever the speed is below the preset speed.

This is to indicate that the main ON/OFF switch will automatically open when the sprayer reaches the preset speed.



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

ATTENTION! When AutoSectionControl is used, the function should be deactivated as the AutoSectionControl will overtake control of the main ON/OFF.

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.

Possible settings are:

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.

Menu 2.2.3 DualLine (not used)

Menu 2.2.3.1 Lower pressure level (not used)

Menu 2.2.3.2 Upper pressure level (not used)

Menu 2.2.4 HeadlandAssist setup (not used)

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	Function
2.2.5.1	Selects whether manual operation is done at the SetBox or at the buttons behind the grip.
2.2.5.2	Selects automatic shift every time the main ON/OFF is pressed.
2.2.5.3	Disables the function.

Menu 2.3 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, remote sensor or a GPS system like HARDI® AutoSectionControl), 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 in the display will be visible. Manual pressure regulation and stepped over/under application is still possible.

Menu 2.4 Set clock

If the Controller prompts for date and time, then 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. Later changes in date and time can be done by following the procedure in "How to set clock" on page 4.2.

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

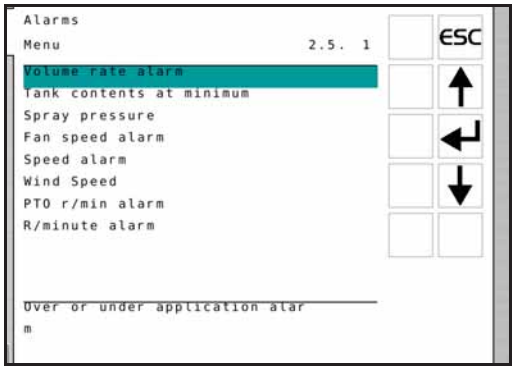
In submenus it is possible to select and set:

Menu	Function
2.4.1	Time format (12 or 24 hour)
2.4.1.1	12 hour format
2.4.1.2	24 hour format
2.4.2	Set time
2.4.3	Set date and month
2.4.4	Set year

Menu 2.5 Alarms

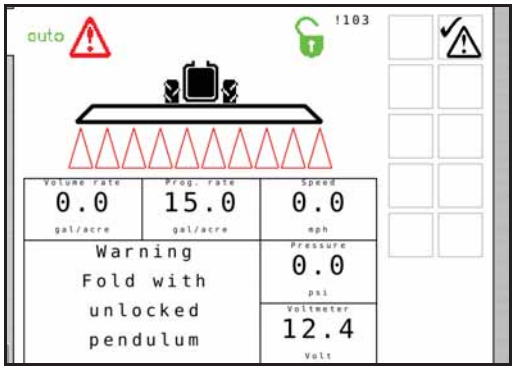
User selectable alarms can be set with parameters of choices given in the submenus of menu 2.5 - refer to "Full menu structure" on page 3.15 for available alarms.

- When outside the alarm parameters, the relevant warning will flash lower left corner of the screen.
- Volume rate alarm for over or under application activates after 20 seconds.



The warnings appear as shown. For more details on warnings, see "Fault codes" on page 11.5.

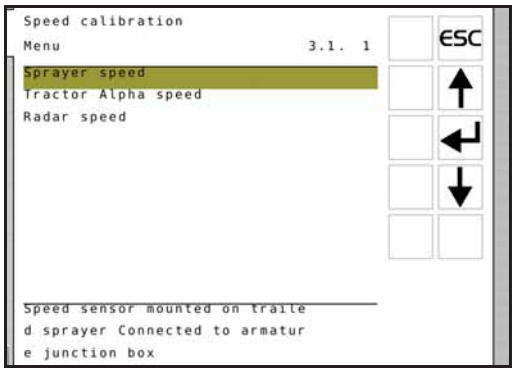
NOTE! The HC 9500 shows the warnings in the top bar of the screen. Other ISOBUS screens may vary.



Menu 3 Calibration

Menu 3.1 Speed calibration

The calibration process is the same for each sensor type. In the following example a "speed sensor on sprayer" (Menu 3.1.1 Sprayer) is used.



The menu can be reached by navigating via the menu structure.

Navigating the menu

1. From menu [3 Calibration] the menu [3.1 Speed calibration] should be selected.
2. Select one of the following menus corresponding to desired speed sensor:

   [3.1.1 Sprayer] Speed sensor on sprayer

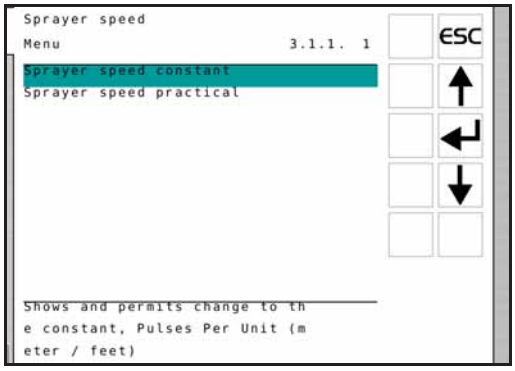
   [3.1.2 Tractor] Speed sensor on tractor (use for GPS speed)

   [3.1.3 Radar] Radar speed sensor
3. The last confirmed sensor is the active speed sensor.
4. Choose submenu.

It is possible to calibrate the speed sensor in different ways. You may enter a theoretical speed constant or perform a practical calibration.

Select calibration method in the two submenus

Menu	Function
3.1.1.1	Speed constant
3.1.1.2	Speed practical



Select one of the calibration methods using the navigation keys, then press Enter to accept.

The procedure for each menu is described in the following sections.

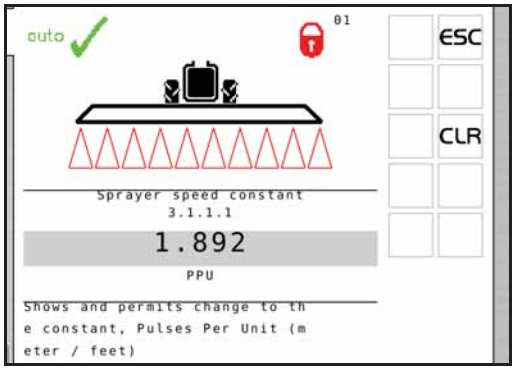
ATTENTION! The practical method is recommended.

ATTENTION! If the speed cannot be calibrated, then deactivate the track function. Contact your HARDI® service center to do this.

7 - Menu 3 Calibration

Menu 3.1.1.1 Sprayer speed constant

The theoretical speed constant, pulses per unit (PPU), is the number of times the speed sensor records holes (or protrusions / magnets) per foot (meter) as the wheel rotates past the sensor. If necessary, this can be calculated by dividing the number of protrusions by the circumference of the tire in feet (meters).



By using known tire dimensions and number of protrusions, the following formulas may be used to calculate the theoretical PPU:

PPU (feet)

$$PPU = \frac{Protrusions \times 12}{\pi \times \left(\frac{Tirewidth \times Ratio}{1270} + Rimheight\right)}$$

PPU (meter)

$$PPU = \frac{Protrusions \times 1000}{\pi \times \left(\frac{Tirewidth \times Ratio}{50} + Rimheight \times 25.4\right)}$$

Example

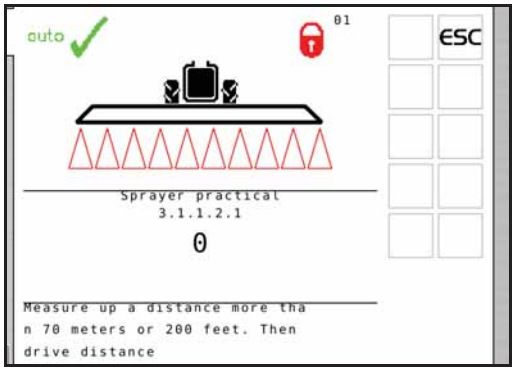
If changing tires on a Commander 7000 (36 protrusions) to a 320/90R50 tire, the PPU (feet) is calculated as follows:

$$PPU = \frac{36 \times 12}{3.14159 \times \left(\frac{320 \times 90}{1270} + 50\right)} = 1.892$$

ATTENTION! The practical method is recommended.

Menu 3.1.1.2 Sprayer speed 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.



NOTE! Calibration should take place in the field with a half full tank and normal working tire pressure in order to obtain the wheel's real "working radius".

ATTENTION! Changing tires will require a new calibration!

Method

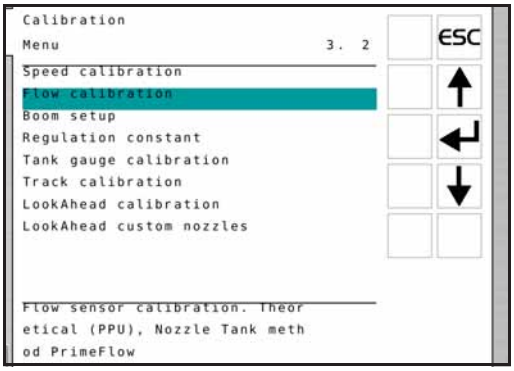
1. Measure a distance not less than 200 feet.
2. Park the tractor at the start of the measured distance.
3. Press Enter. When zero distance [0] shows, drive the distance.
4. Press Enter.
5. Correct the distance shown on the display to read the actual distance.
6. Press Enter to see the new calculated value.
7. Press Enter again to accept the value.
8. Repeat process to verify calibration. PPU should not change significantly if calibration has been made correctly.

Menu 3.2 Flow calibration

The flow transducer can be calibrated theoretically or calibrated with clean water by using one of the two practical methods.

The practical methods are preferred:

Method	Calibration time	Accuracy
Tank method	Time consuming	Accurate
Nozzle method	Short	Inaccurate



ATTENTION! When changing to nozzles with more than a 100% increase or decrease in output, it is recommended to re-calibrate the flow transducer.

ATTENTION! Calibration is recommended to be done at least once during the spraying season. Use the chart "Chart for recording values" on page 13.4 to record the values.

Menu 3.2.1 Flow constant

When spraying both fertilizer and chemical, HARDI® recommends to use 2 different flow sensor housings in order to get good pressure regulation. The same flow sensor wheel is used for both flow sensor housings. Flow sensor calibration PPU must be changed each time flow sensor housings are changed.

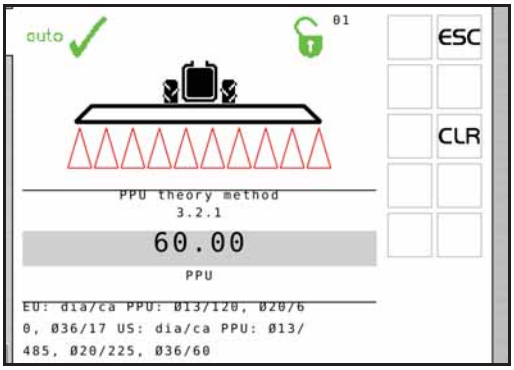
Correct flow housing can easily be selected based on:

- Sprayer boom width.
- Operator's typical spray pressure in the field (max. pressure).
- Nozzle ISO size typically selected by operator.

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

Housing	Housing identification (A)	Flow range	Orifice	PPU
		g/min	mm	value
S/67	One outside groove	2 - 30	13.5	430.00
S/67	No groove	4 - 70	20.0	215.00
S/67	Two outside grooves	20 - 160	36.0	60.00

To change the theoretical flow constant, use the navigation keys to enter a new PPU value.



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

ATTENTION! Entering a theoretical PPU value does not guarantee accuracy. Flow calibration should still be carried out using one of the practical methods.

7 - Menu 3 Calibration

Flow rate charts for various spraying pressures

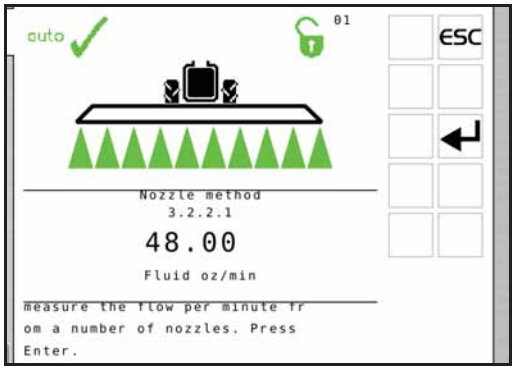
Flow rates at 40 psi spraying pressure			Flow (gpm) by Boom size (20" nozzles)						
Nozzle	**Flow (gpm)**	**Flow housing**	**132 ft**	**120 ft**	**100 ft**	**90 ft**	**80 ft**	**66 ft**	**60 ft**
Pink ISO 0075	0.075	One groove Ø13.5 mm	6	5.4	4.5	4.0	3.6	3	2.7
Orange ISO 01	0.100	One groove Ø13.5 mm	8	7.2	6	5.4	4.8	4	3.6
Green ISO 015	0.150	One groove Ø13.5 mm	12	10.8	9	8.1	7.2	6	5.4
Yellow ISO 02	0.200	One groove Ø13.5 mm	16	14.4	12	10.8	9.6	8	7.2
Lilac ISO 025	0.250	One groove Ø13.5 mm	20	18	15	13.5	12	10	9
Blue ISO 03	0.300	No groove Ø20 mm	24	21.6	18	16.2	14.4	12	10.8
Red ISO 04	0.400	No groove Ø20 mm	32	28.8	24	21.6	19.2	16	14.4
Brown ISO 05	0.500	No groove Ø20 mm	40	36	30	27	24	20	18
Grey ISO 06	0.600	No groove Ø20 mm	48	43.2	36	32.4	28.8	24	21.6
White ISO 08	0.800	Two grooves 36 mm	64	57.6	48	43.2	38.4	32	28.8
Light blue ISO 10	1.000	Two grooves 36 mm	80	72	60	54	48	40	36

Flow rates at 60 psi spraying pressure			Flow (gpm) by Boom size (20" nozzles)						
Nozzle	**Flow (gpm)**	**Flow housing**	**132 ft**	**120 ft**	**100 ft**	**90 ft**	**80 ft**	**66 ft**	**60**
Pink ISO 0075	0.092	One groove Ø13.5 mm	7.4	6.6	5.5	5.0	4.4	3.7	3.3
Orange ISO 01	0.122	One groove Ø13.5 mm	9.8	8.8	7.3	6.6	5.9	4.9	4.4
Green ISO 015	0.184	One groove Ø13.5 mm	14.7	13.2	11.0	9.9	8.8	7.4	6.6
Yellow ISO 02	0.245	One groove Ø13.5 mm	19.6	17.6	14.7	13.2	11.8	9.8	8.8
Lilac ISO 025	0.306	No groove Ø20 mm	24.5	22.0	18.4	16.5	14.7	12.2	11.0
Blue ISO 03	0.367	No groove Ø20 mm	29.4	26.4	22.0	19.8	17.6	14.7	13.2
Red ISO 04	0.490	No groove Ø20 mm	39.2	35.3	29.4	26.5	23.5	19.6	17.6
Brown ISO 05	0.612	No groove Ø20 mm	49.0	44.0	36.7	33.0	29.4	24.5	22.0
Grey ISO 06	0.735	Two grooves Ø36 mm	58.8	52.9	44.1	36.7	35.3	29.4	26.5
White ISO 08	0.980	Two grooves Ø36 mm	78.4	70.6	58.8	52.9	47.0	39.2	35.3
Light blue ISO 10	1.225	Two grooves Ø36 mm	98.0	88.2	73.5	66.2	58.8	49.0	44.1

Flow rates at 70 psi spraying pressure			Flow (gpm) by Boom size (20" nozzles)						
Nozzle	**Flow (gpm)**	**Flow housing**	**132 ft**	**120 ft**	**100 ft**	**90 ft**	**80 ft**	**66 ft**	**60 ft**
Pink ISO 0075	0.099	One groove Ø13.5 mm	7.9	7.1	5.9	5.3	4.8	4.0	3.6
Orange ISO 01	0.132	One groove Ø13.5 mm	10.6	9.5	7.9	7.1	6.3	5.3	4.8
Green ISO 015	0.198	One groove Ø13.5 mm	15.8	14.3	11.9	10.7	9.5	7.9	7.1
Yellow ISO 02	0.265	No groove Ø20 mm	21.2	19.1	15.9	14.3	12.7	10.6	9.5
Lilac ISO 025	0.331	No groove Ø20 mm	26.5	23.8	19.9	17.9	15.9	13.2	11.9
Blue ISO 03	0.397	No groove Ø20 mm	31.8	28.6	23.8	21.4	19.1	15.9	14.3
Red ISO 04	0.529	No groove Ø20 mm	42.3	38.1	31.7	28.6	25.4	21.1	19.0
Brown ISO 05	0.661	Two grooves Ø36 mm	52.9	47.6	39.7	35.7	31.7	26.4	23.8
Grey ISO 06	0.794	Two grooves Ø36 mm	63.5	57.2	47.6	42.9	38.1	31.8	28.6
White ISO 08	1.058	Two grooves Ø36 mm	84.6	76.2	63.5	57.1	50.8	42.3	38.1
Light blue ISO 10	1.323	Two grooves Ø36 mm	105.8	95.3	79.4	71.4	63.5	52.9	47.6

Menu 3.2.2 Nozzle method

Compares the individual nozzle output on the display to the actual individual nozzle output. The output displayed is corrected to read the actual output.



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 Enter. The display will then show the individual nozzle output per minute.

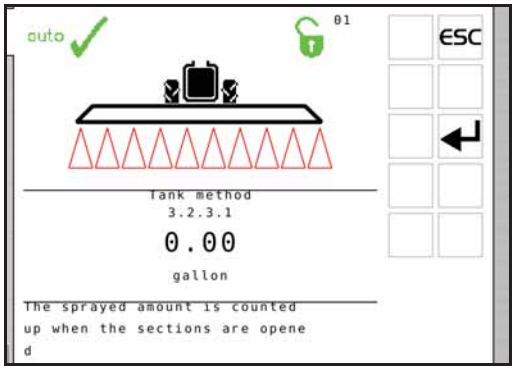
ATTENTION! If a section has not been opened or an end nozzle is not closed, a warning will show up in the largest window on the display.

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 Enter.
6. Correct the output shown on the display to read the average output measured with the calibration jug.
7. Press Enter to see the new value.
8. Press Enter again to accept the value.

Menu 3.2.3 Tank method

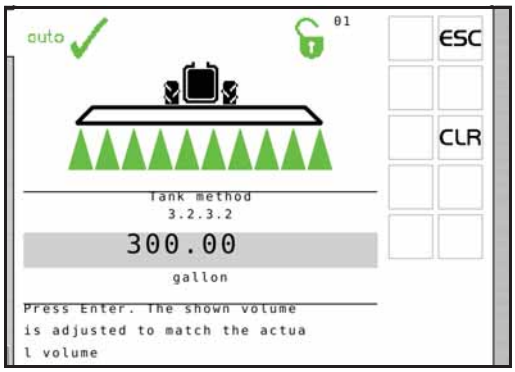
The tank is partly emptied through the nozzles while the display calculates the quantity emptied on the basis of the actual calibration value (PPU). The quantity displayed is corrected to read the actual measured quantity emptied.

This can be done according to the tank contents level indicator or by weight difference before and after.



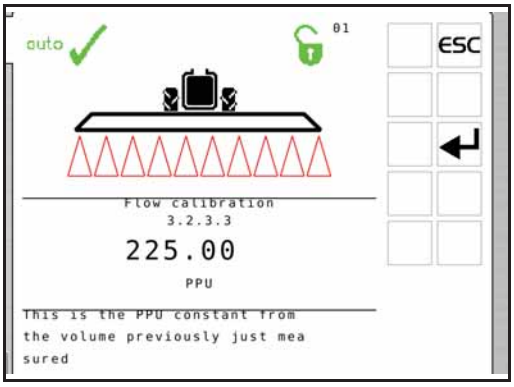
Method

1. Fill the sprayer with a known amount of water, e.g. 500 gallons. It is recommended to weigh the sprayer before and after filling in order to get an exact value.
2. Open all boom sections.
3. Go to menu [3.2.3 Tank method], press Enter 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, 300 gallons have been emptied out as shown by the tank contents level indicator, then switch the main ON/OFF to OFF. Weigh the sprayer again to get the exact volume sprayed out.



6. Press Enter.
7. Correct the volume shown in menu 3.2.3.2 on the display to read the actual measured volume emptied.

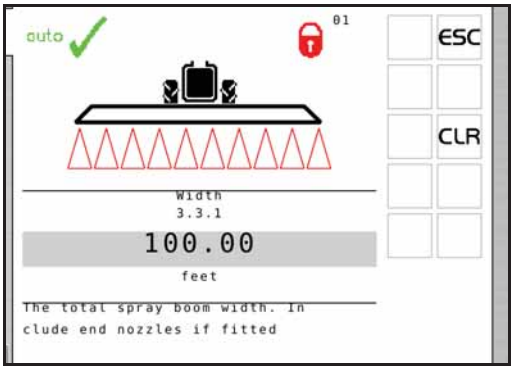
8. Press Enter to see the new value.
9. Press Enter again to accept the new value.



Menu 3.3 Boom

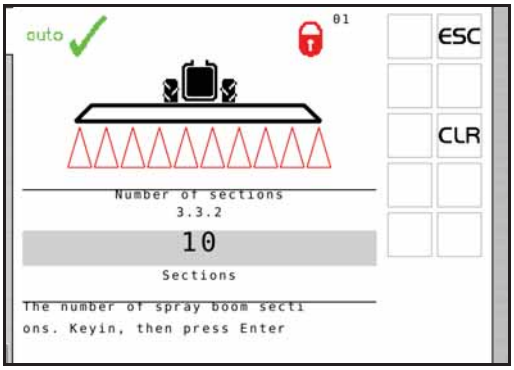
Menu 3.3.1 Width

1. Set boom width.
2. Press Enter to confirm.



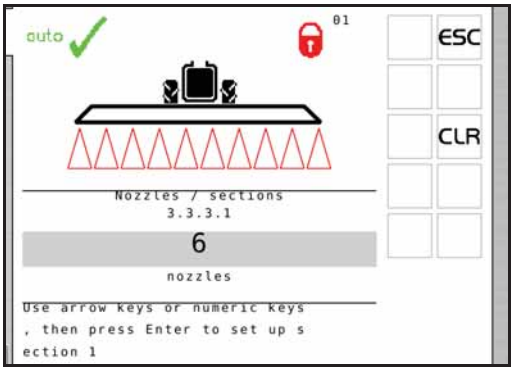
Menu 3.3.2 Number of sections

1. Set number of boom sections.
2. Press Enter to confirm.



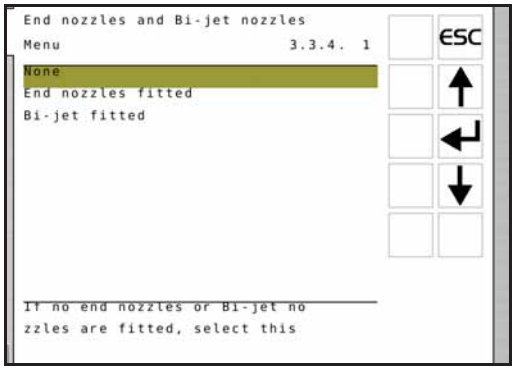
Menu 3.3.3 Nozzles/sections

1. Set correct number of nozzles per section.
2. Press Enter to continue to next boom section.
3. Press Enter after the last section.



Menu 3.3.4 End nozzles and Bi-jet (optional)

If end nozzles or Bi-jet 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 Enter.
3. Select submenu corresponding to the type of end nozzle:

Menu	Function
3.3.4.1	None
3.3.4.2	End nozzles fitted
3.3.4.3	Bi-jet fitted

4. Press Enter.
5. In the sub menus [3.3.4.2] and [3.3.4.3] set the value to the equivalent coverage by the boom nozzles. E.g. end nozzle coverage is 5 feet. This is equal to 3 boom nozzles.

ATTENTION! It is important that the volume applied from the end nozzle matches the volume applied under the boom, i.e. end nozzles mounted must have the same ISO size as the regular nozzles on the boom. This is a comparison of volume per minute per length (Gallons/min/inches).

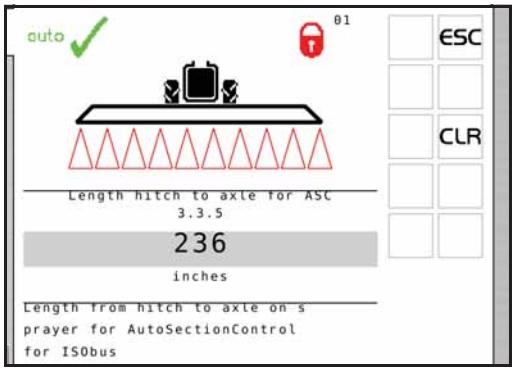
When the end nozzle is active, the area covered and volume sprayed is calculated and registered. If "Active boom size" is displayed, it will show an increase when the end nozzle is activated.

The table below is based on data from the Hardi® Nozzle product guide and is valid at 45 psi (3 bar).

End nozzles	Width (inches)	Total flow/nozzle (gpm)	Equivalent ISO nozzle size	20" flow/nozzle (gpm)
1850 End nozzle 3/8" - SYNTAL				
1850 G-150	61	0.274	Pink ISO 0075	0.09
1850 G-200	77	0.449	Orange ISO 01	0.12
1850 G-250	98	0.777	Green ISO 015	0.16
1850 G-300	110	0.970	Green ISO 015	0.18
1850 G-350	116	1.480	Lilac ISO 025	0.26
1850 G-400	136	2.039	Blue ISO 03	0.30

Menu 3.3.5 Length hitch to axle for ASC

Set length from the tractor's hitch eye to the sprayer's wheel axle. The distance is used when determining the path of the spray rig as it moves around in the field.



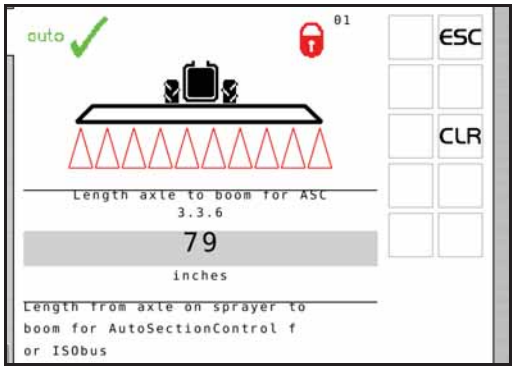
ATTENTION! This menu is only for sprayers equipped with ISOBUS and AutoSectionControl.

7 - Menu 3 Calibration

Menu 3.3.6 Length axle to boom for ASC

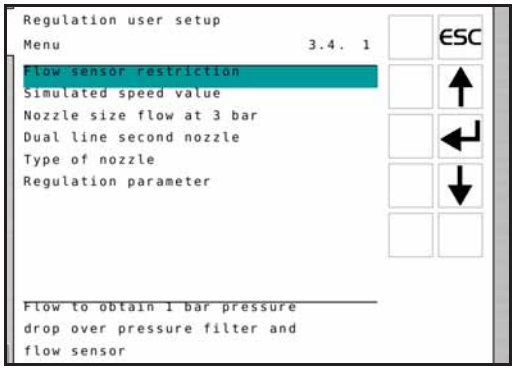
Set length from the sprayer's wheel axle to the boom, measured at the nozzles. The distance is used when determining the path of the spray rig as it moves around in the field.

ATTENTION! This menu is only for sprayers equipped with ISOBUS and AutoSectionControl.



Menu 3.4 Regulation user setup

The sensitivity of pressure regulation valve can be adjusted. Values are to be set for obtaining precise regulation, even if sensors fails.



The valve is controlled by up to five main sensors:

- Sprayer speed sensor:
  This sensor reads the sprayer's forward speed which is used for calculating the volume rate at all spraying speeds.
- Flow sensor:
  This sensor reads the flow at the operating unit which is used for calculating the pressure at all flow rates.
- Pressure sensor:
  This sensor reads the pressure at the operating unit which is used for calculating the flow at the pressure regulation valve.
- P.T.O. RPM sensor:
  This sensor reads the pump RPM's which is used to calculate the flow from the pump at all pump speeds.
- Regulation valve opening angle sensor:
  This sensor reads the opening angle for the rotary valve inside. When opening angle is known, the flow can be calculated when the pressure is also known. The result is when forward speed, pump RPM's, etc. is known, then the regulation valve can predict setting (Feed Forward) before opening the main ON/OFF. Thereby the volume rate is correct even the forward speed has changed significantly since the main ON/OFF was closed (no fluctuation).

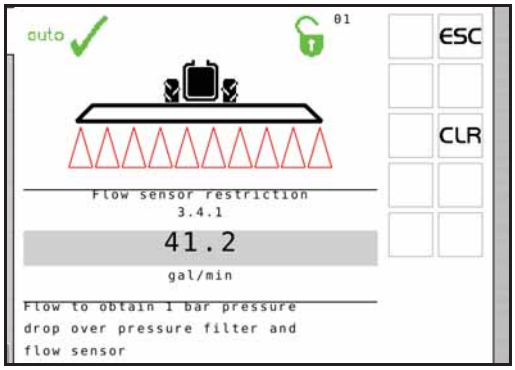
Menu 3.4.1 Flow sensor restriction

The menu defines the resistance in the plumbing and circuits of the specific sprayer setup. As the resistance varies with the choice of flow housing, this must be set up prior to spraying.

- Select value from the schematic and enter it in this menu.

Flow housing	Flow
HARDI® 13.5 mm	26.2 gpm
HARDI® 20 mm	41.2 gpm
HARDI® 36 mm	48.1 gpm

- Default value: 41.2 gpm (156 l/min)



Menu 3.4.2 Simulated speed value

The "Simulated speed value" menu is used in 2 situations:

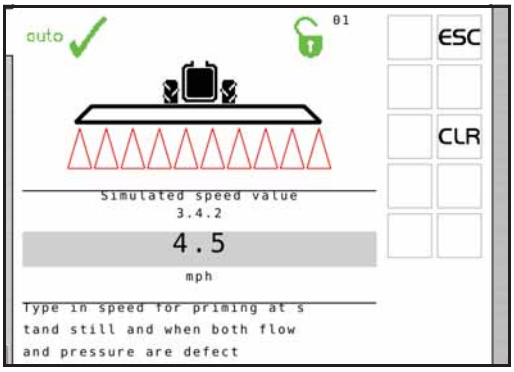
- When stopped or driving very slowly while priming the boom. This feature allows the operator to stop or drive slowly and automatically get normal spray pressure to prime the boom.

- If speed sensor is defective. In this case the computer will assume that the sprayer is traveling with the speed typed in "Simulated speed value". The operator should keep the tractor constantly at this speed to maintain a good regulation with ability to handle changes in application rate and changes in sections.

  Speed entered should be appropriate also for headlands. If speed is reduced at headlands, resulting application rate will be higher than set value. I.e if operator selects application rate of 20 gpa and speed of 5 mph and then reduces speed from 5 to 4 mph at headlands, actual application rate will increase to 25 gpa.

Also when spraying speed drops below the lowest speed where a spray job can begin when starting at headland (this speed is set by the HARDI® dealer), the speed will be simulated to maintain normal spray pressure until normal spraying speed is maintained.

- Default value: 4.5 mph (7.2 km/h)



ATTENTION! Use this menu when a spray job has to be finished before fixing the defective sensors.

ATTENTION! Recommended setting is 75-90% of spraying speed.

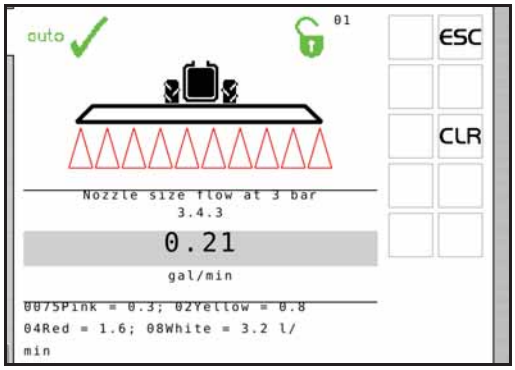
Menu 3.4.3 Nozzle size flow at 45 psi

In fault free operation, the controller uses the flow sensor and the pressure sensor to detect the nozzle size.

In case of flow sensor and/or pressure sensor fault, the nozzle flow can be entered to obtain a more accurate regulation of the regulation valve.

If either the flow sensor or the pressure sensor is faulty, the nozzle cannot be identified. The controller stores the last detected nozzle size, and this value is then used.

- Default value: 0.21 gpm (0.80 l/min)



ATTENTION! If changing nozzles while a sensor is faulty, then type in the size of the new nozzle.

Nozzle size is defined as flow at 3 bar as to be seen in the Hardi® nozzle catalog.

NOTE! The flow at 45 psi in the Hardi® nozzle catalog is measured without nozzle filter and without Pentalet nozzle holder. The flow restriction from these 2 make the nozzle appear smaller, see table below.

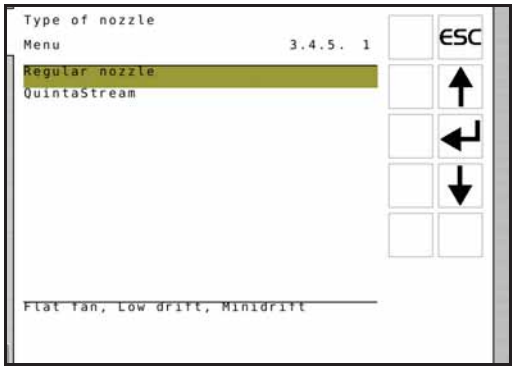
Nozzle	Flow (gpm)
0075-Pink	0.08
010-Orange	0.11
015-Green	0.16
020-Yellow	0.21
025-Lilac	0.26
03-Blue	0.32
04-Red	0.42
05-Brown	0.53
06-Grey	0.63
08-White	0.85
10-Light blue	1.06

Menu 3.4.4 Dual line second nozzle (not used in North America)

Menu 3.4.5 Type of nozzle

Select the nozzle type to be used when spraying.

- Default value: Regular nozzle.

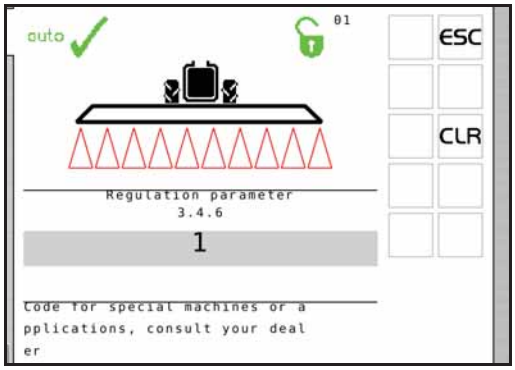


ATTENTION! Remember to change the specific gravity of the chemical mix in menu [3.5.1 Adjustment of specific gravity].

Menu 3.4.6 Regulation parameter

Code for special machines or applications, consult your HARDI® Service Center.

- Default value: Code 1

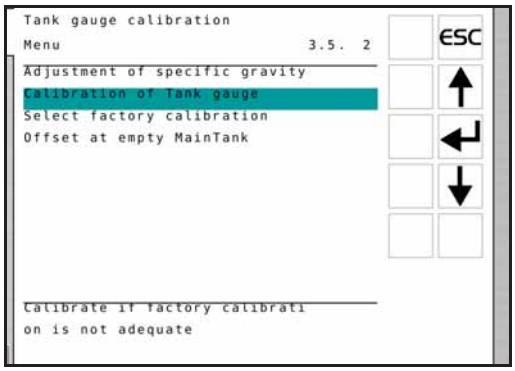


Menu 3.5 Tank gauge

Present accuracy is up to +/- 7 gallons. This is at the widest liquid surface area in the tank. The smaller the liquid surface area, the more accurate the readout.

ATTENTION! For increased accuracy it is recommended to do the flow calibration (menu 3.2) before proceeding.

ATTENTION! This menu item is only present if the HARDI® Tank Gauge is fitted.



Menu 3.5.1 Adjustment of specific gravity

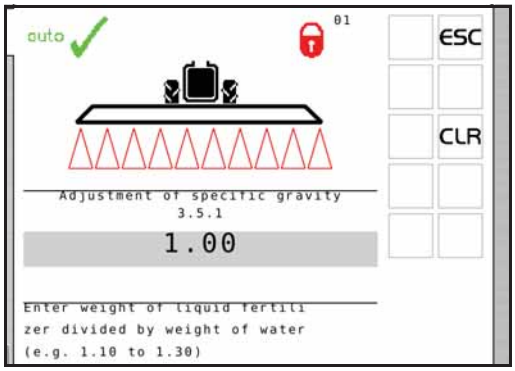
The correction factor for the specific gravity of the liquid sprayed can be set.

Default value is 1.00.

Corrected value is weight of solution divided by weight of water.

For liquid fertilizers, the specific gravity may range up to 1.3 times heavier than water. The value in this case would be 1.30.

ATTENTION! Remember to set type of nozzle to be used in menu [3.4.5 Type of nozzle].



Method

1. Set specific gravity.
2. Press Enter to confirm.

Menu 3.5.2 Calibration of Tank gauge

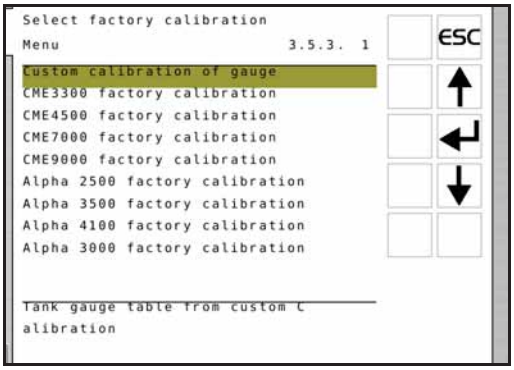
ATTENTION! Prior to attempting a custom calibration, the SafeTrack must be disabled in the extended menu.

Calibration of the HARDI® Tank Gauge is necessary if the factory calibration shows inaccurate. E.g. different placed hitch point on the tractor or other tire mounting may result an inaccurate calculation of the tank contents.

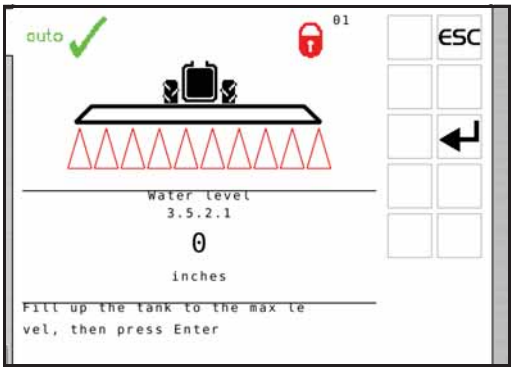
Therefore it is recommended to begin the custom calibration by connecting the sprayer to the tractor that will be used for spraying. Later changes of tractor can affect the accuracy of the Tank gauge.

Custom calibration

1. First enter menu [3.5.3.01 Custom calibration of gauge].



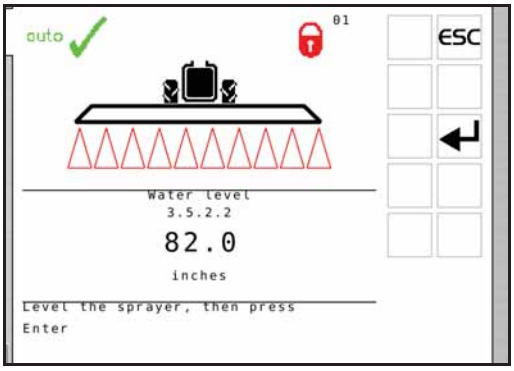
2. Go to menu [3.5.2.1 Water level].
3. Fill the sprayer up to nominal tank contents, using an external calibrated flowmeter. Alternatively weigh the sprayer before and after filling, and note the weight difference.
4. Press Enter.



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 weighing the sprayer before/after filling is used.

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

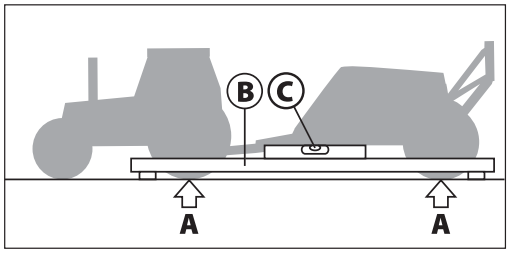
5. Press Enter after ensuring the sprayer is level. Refill the tank up to the tank lid if the sprayer is re-levelled.



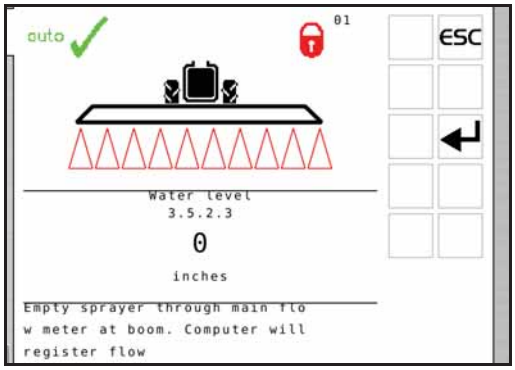
ATTENTION! Levelling the procession of sprayer is of great importance as the accuracy is directly affected!

Assuming 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) approximately 20 feet long, 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.



6. Engage the pump and set P.T.O. revolutions at 540 rpm or 1000 rpm (depending on pump model).
7. Open all boom sections and empty the tank. The pulses from the flow transducer are logged as data points.



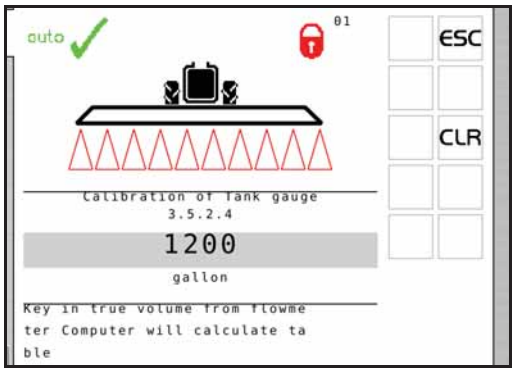
During this session the screen shows:

[xxxx] as the actual water level in inches and

[yyyyyyy] is the number of pulses from the flow meter.

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 3 gallons in the sump of the tank.

8. Press Enter when the tank is empty.
9. Correct the displayed volume to the actual volume sprayed out.
10. Press Enter. The new custom gauge table is calculated and the calibration of the HARDI® Tank Gauge is finished.



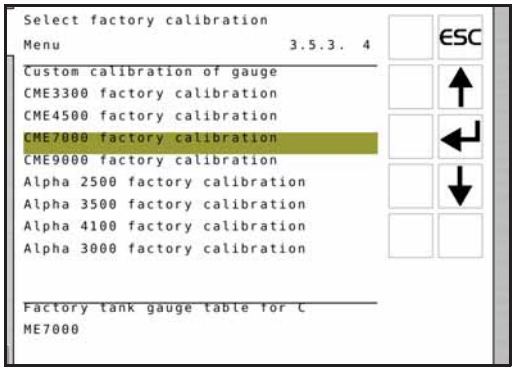
Menu 3.5.3 Select factory calibration

This menu may have been set up by your HARDI® service center. Selection can only be done with no water in the tank. See "Menu 3.5.4 Offset at empty main tank" 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 model	Place of level
5500 or smaller	Underside of the frame.
8500 or larger	Upper side 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 21.7" (550 mm). Measure of tank contents changes with the height of the hitch point.

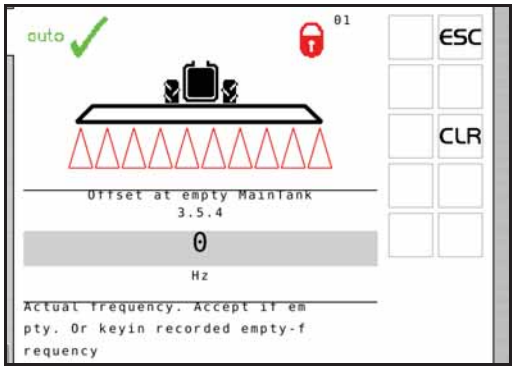
ATTENTION! If one of the prerequisites are not fulfilled, then refer to "Menu 3.5.2 Calibration of Tank gauge" to make a custom calibration of the tank gauge.

7 - Menu 3 Calibration

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 main tank is empty, then press Enter 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.



NOTE! The definition of an empty tank is when the pump is not able to suck more liquid from the tank, i.e. there will still be a very small amount of liquid in the sump when the tank is defined empty.

ATTENTION! This can also be useful for re-calibrating empty tank frequency if the sensor has dirt on it.

Menu 3.6 Track

There is no standard setting for the Track setup. The Track needs to be adjusted for different kinds of tractors, the sprayer and spraying practices and can only be found under actual conditions.

Spraying speed	Track setup
High speed (12 to 16 mph)	Must react slowly: The dead zone must be increased.
Low speed (4 to 6 mph)	For high precision: The dead zone can be reduced.

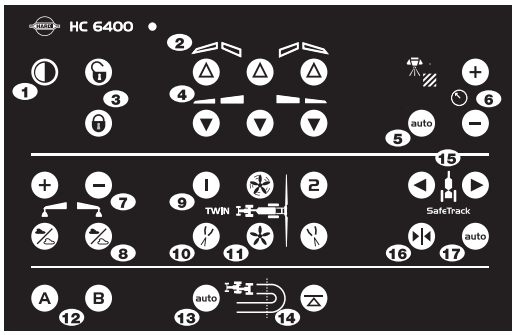
For each adjustment, it's described what happens if the setting is changed and what effect will it have on the sprayer.

SafeTrack

SafeTrack is operated at the SetBox.

Track selection switches has 3 functions:

1. Align button (16) will align the sprayer. Used before folding the boom.
2. Auto button (17) switches SafeTrack into auto mode and the sprayer will follow the track from the tractor.
3. Manual buttons (15) will steer the sprayer right and left. Auto is OFF when using manual buttons (15).



ATTENTION! If unsafe driving occurs, an alarm will be triggered and the sprayer will align.

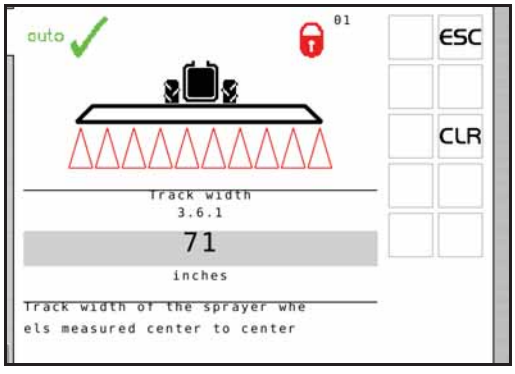
- Press Enter to turn alarm off.
- Pressing "align" (16) will also turn alarm off. Be aware that the alarm cannot be turned off as long as unsafe driving still occurs!

Menu 3.6.1 Track width

Here the track width can be entered.

- The track width is measured from right side tire center to left side tire center of the sprayer wheels.

It is important that the correct track width is entered. The controller will calculate the speed at the center of sprayer, and not at the wheel sensor as speed would vary in right and left turns.



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

Factory setting: 71" (180 cm)

Menu 3.6.2 Tractor drawbar

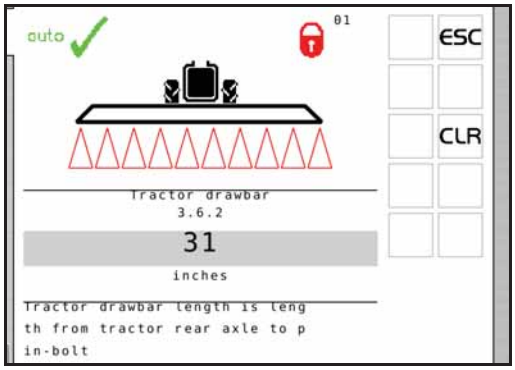
Here the length of the tractor drawbar is entered.

- The measurement is from the center of the tractor rear axle to the center of the drawbar pin.

This has to be adjusted every time a new tractor is hooked on to the sprayer. When hooked up, check the rigidity of the tractor drawbar mounts. There must be no sideways movement.

Factory setting: 31" (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 too short curves.

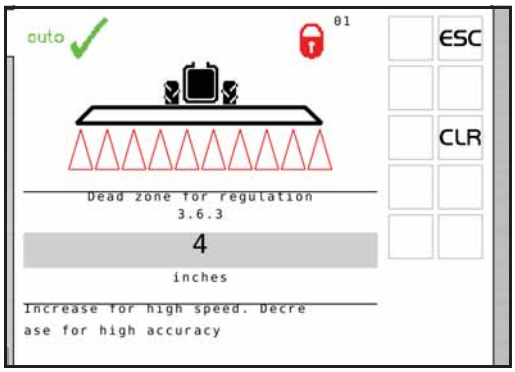


Menu 3.6.3 Dead zone for regulation

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: 4" (10 cm); Over 8" (20 cm) not recommended.

Decreasing value:	Reacting on small deviations. Tendency to oscillation 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.

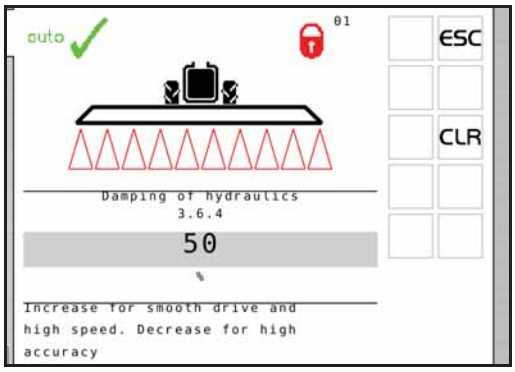


Menu 3.6.4 Damping of hydraulics

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.

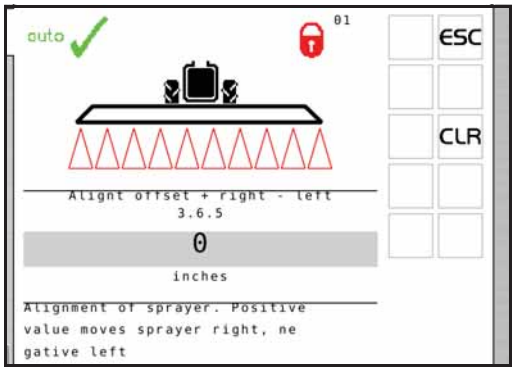


Menu 3.6.5 Align offset + right - left

This is to compensate if the front potentiometer is placed offset to the center line when the sprayer is attached.

Factory setting: 0" (0 cm)

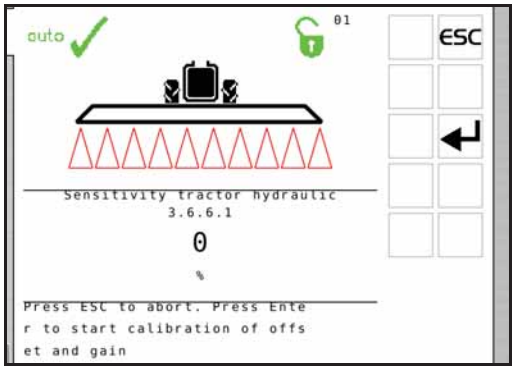
Negative setting will move the sprayer to the left of the track, and positive setting will move the sprayer to the right of the track. The sprayer must follow the tractor in a straight line in all situations. If the value is over 4" (10 cm), it is recommended to manually adjust position of the front angle sensor.



Menu 3.6.6 Calibrate sensitivity

This adapts the track regulation to the tractor hydraulics and to the characteristics of the sprayer hydraulics system.

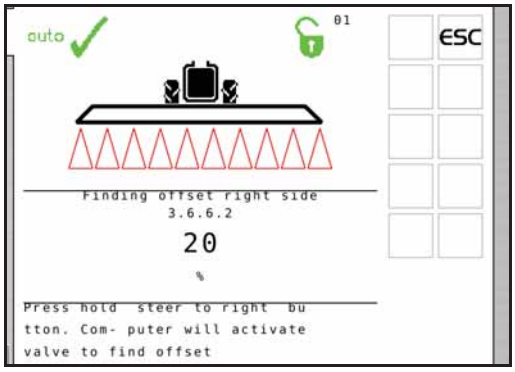
Calibration procedure is divided into 4 parts where an offset and gain value is found to both left and right movement, 4 values in all.



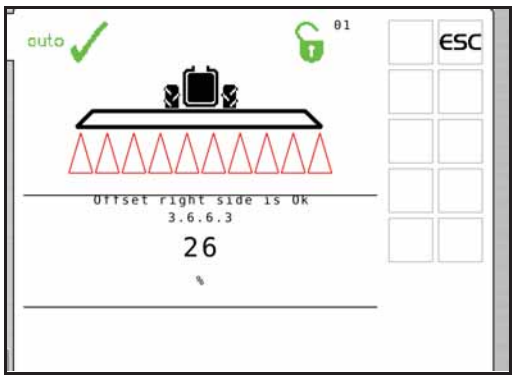
Method

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 SetBox. First left/ right offset is found:
3. Go to menu [3.6.6 Sensitivity] and select "Yes" and press Enter. Press Enter again and calibration starts.
4. Press and hold the manual "steer to right" button (A).

5. Display will show a counting percentage.

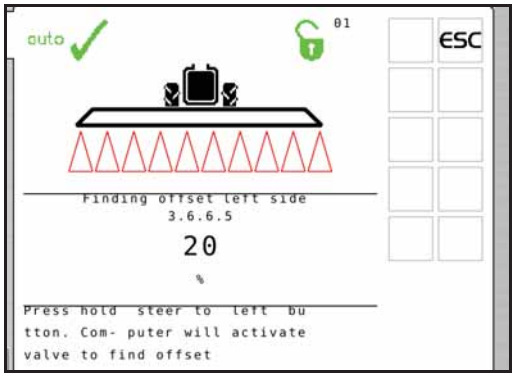


6. When offset is found it ends with an "OK" message.

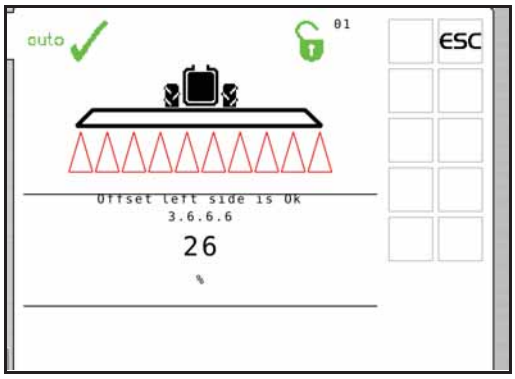


7. Press and hold the manual "steer to left" button (B).

8. Display will show a counting percentage.

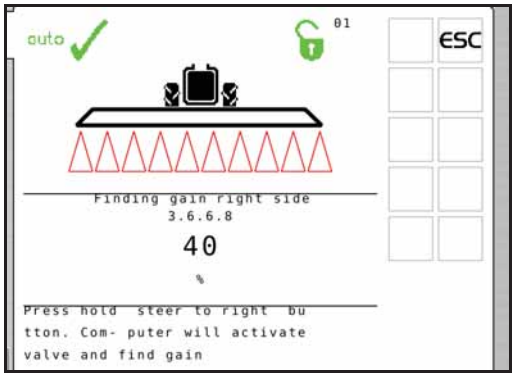


9. When offset is found it ends with an "OK" message.

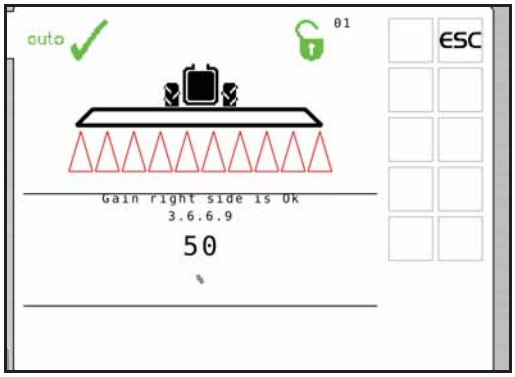


10. Then calibration automatically continues with gain calibration. Press and hold the manual "steer to right" button (A).

11. Display will show a counting percentage.

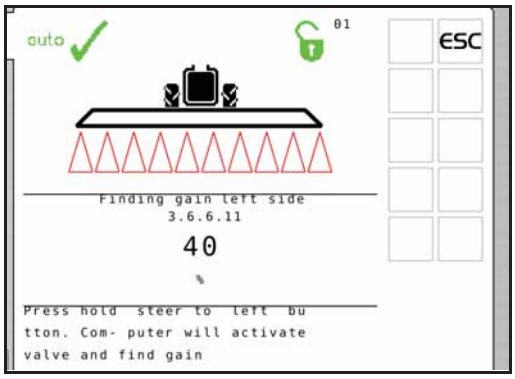


12. When offset is found it ends with an "OK" message.

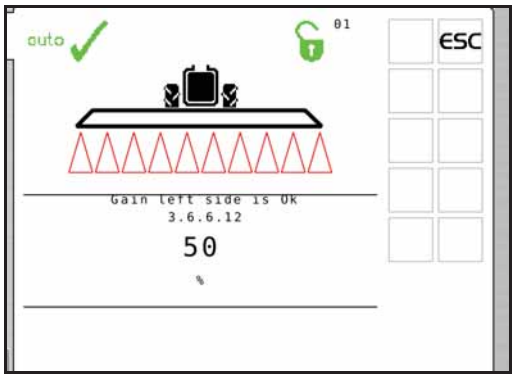


13. Press and hold the manual "steer to left" button (B).

14. Display will show a counting percentage.



15. The display reads "Calibration is OK" when calibration has finished. Confirm and leave menu by pressing Enter.



Emergency Track

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

Menu 4 Toolbox

Menu 4.1 Measure

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].

1. Press Clear to clear the value.

Following submenus are possible:

[4.1.1 Measure Distance]	Measures a distance being travelled.
[4.1.2 Measure Area]	Measures the area the boom covers at a travelled distance.
[4.1.3 Setup 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

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 center]	250	See sprayer instruction book, Maintenance.
[4.2.4 Miscellaneous service]	0	Not defined from factory.
[4.2.5 Check nozzles]	10	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 a "Miscellaneous service" interval. If no interval is set, [Miscellaneous service not defined] is shown.

Press Enter 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

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

Menu & interval	Hours	Action
[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 center]	250	See sprayer instruction book, Maintenance.
[4.2.4 Miscellaneous service]	-	Not defined from factory.
[4.2.5 Check nozzles]	10	Check flow rate. Change nozzles if more than 10% of rated flow.

1. Press Clear to reset hour meter.
2. Press Enter to confirm.

Menu 4.4 Reserved

Reserved function - This menu is not used

8 - Menu 4 Toolbox

Menu 4.5 Test

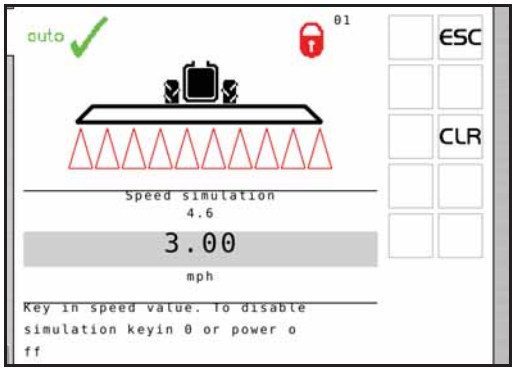
All readouts for the transducers are in accumulated counts, i.e. one signal gives one count, except for the optional (analog) transducer that is read in milliampere.

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

Menu	Help text	
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.	Not for ISOBUS
4.5.4 Input test	See computer readings of sensors. Frequency, switch, analog inputs.	
4.5.5 Valve test	Self test.	
4.5.6 PrimeFlow SMCU status	See nozzle position, nozzle order, counts of data error power error.	
4.5.6 PrimeFlow motor status	See nozzle motor status.	

Menu 4.6 Speed simulation

Speed may be simulated for certain purposes. A two figure value may be entered. The state remains valid until the Controller is restarting or the value is set to "0".



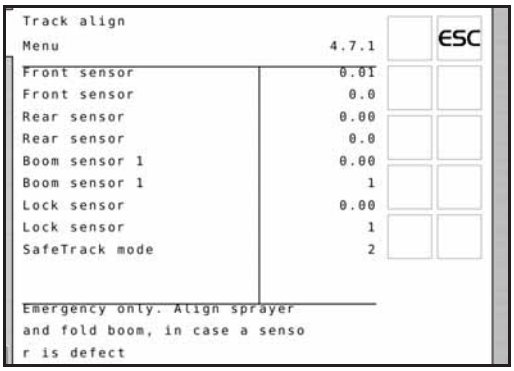
Menu 4.7 Emergency

This menu bypasses the system so all sensors are ignored. Then it is possible to align the sprayer or fold the boom manually and drive home. The sensor status and voltages can be checked, which is useful for HARDI® service to solve the problem.

Menu 4.7.1 Track align

The sensor status and voltages can be checked when aligning the sprayer.

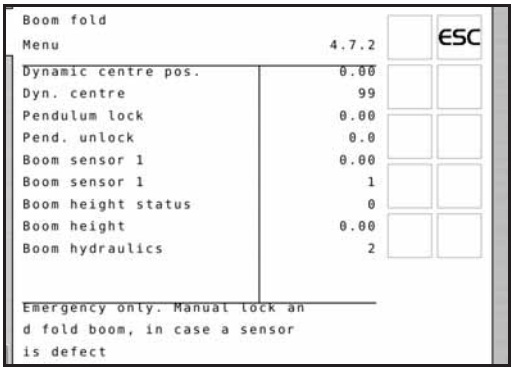
NOTE! Values shown in illustration is an example only.



Menu 4.7.2 Boom fold

The sensor status and voltages can be checked when folding the boom.

NOTE! Values shown in illustration is an example only.



Lock sensor:

Lock sensor indication	Track selection switch	Left/right steer	Fold inner
Released (high voltage)	Auto or Manual	Possible	Possible
Locked (low voltage)	Auto or Manual	Not possible	Possible

If the track selection switch is switched to "align" the trapeze lock is attempted locked disregard any sensor reading. No automatic align is attempted. 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, stop oil flow to the sprayer and switch power to OFF on the SetBox in order to turn off the JobCom.

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

Menu 4.8 Computer CAN status

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

Menu 4.8.X Computer CAN status:

[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 Clear key to reset counters.	
[4.8.5 Work status JobCom HC 6100]	Show faults occurred since power-up.	Press C key to reset counters.	Not for ISOBUS
[4.8.6 Work status Grip HC 6300]	Show faults occurred since power-up.	Press C key to reset counters.	Not for ISOBUS
[4.8.7 Work status SetBox HC 6400]	Show faults occurred since power-up.	Press C key to reset counters.	Not for ISOBUS
[4.8.8 Work status FluidBox HC 6200]	Show faults occurred since power-up.	Press C key to reset counters.	Not for ISOBUS

Menu 5 Logbook

Menu 5.1 Print

This menu has to do with printing of data. The following can be printed via the 12 volt printer.

Menu	Help text
[5.1.1 Print single register]	A specific register is selected for a print.
[5.1.2 Print all registers]	Register in use will be printed. Print starts upon key press on Enter.
[5.1.3 Print configuration]	Records all system parameters. Print starts upon key press on Enter.
[5.1.4 Print PrimeFlow status]	Print status for all computer. Print starts upon key press on Enter.
[5.1.5 Print PrimeFlow motor status]	Print status for all motors Print starts upon key press on Enter.

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                               1
Volume applied:                  332 gal
Area:                           4.72 ac
Travelled spray distance         0.9 mi
Start date                     10;13;14
Start time                        11;00
Stop date                      10;13;14
Stop time                         11;47
Time used (spraying time)            00
Work rate                    7.19 ac/h
Average spray speed              1.4 mph
Max. spray speed                 4.5 mph
Average volume rate             22.8 gpa
Date printed                   10;13;14
Time printed                      11;58
Notes
```

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

Date printed:                  10;13;14
Time printed:                     3;40

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

Terminal Serial number:       2011120983
JobCom Serial number:         2011114057
Terminal SW version:                3.03
JobCom SW version:               1709.00
Register:                             1
Total volume applied:            332 gal
Total area:                     4.72 ac
Tot travel spray distanc:        0.9 mi
Start date:                    10;13;14
Start time:                       11;00
Stop date:                     10;13;14
Stop time:                        11;47
Tot time used spray time:             0
Total work rate:             7.19 ac/h
Total averag spray speed:        1.4 mph
Total max. spray speed:          4.5 mph
Total averag volume rate:       22.8 gpa
```

9 - Menu 5 Logbook

Menu 5.2 Data dump

Enables data dump to an office printer. This could be done for example, by using the HyperTerminal function in Microsoft Windows.

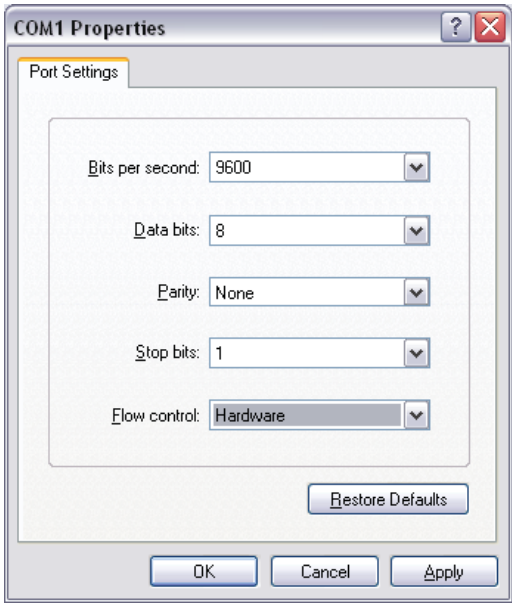
Menu	Help text
[5.2.1 Data dump of raw data]	Transmits data from all 99 registers in comma-separated file for Excel.
[5.2.2 Hyperterminal service report]	Transmits to PC at high speed. Show Configuration, Error Log, Track, PrimeFlow.

For HyperTerminal to communicate properly the COM port settings must be set as shown before transmitting data.

The Hyper Terminal has to be activated on the PC and a communication cable (ref. no. 72271600) must be connected to the COM port:

ISOBUS:

- COM 1 on the SetBox.



Off-season storage

Storage

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

ATTENTION! If the light emitting diode on the SetBox or Grip lights or flashes, the system is still powered!

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

Operational problems

Fault finding the system

When a problem occurs with the system, it is good practice to go through the general fault finding schematic, before contacting your HARDI® dealer.

Problem	Possible cause	Try/Test	Check/Behavior
Flow	Is there flow readout?	Select l/min in the system menu.	Does this correspond to actual flow?
		Use test menu. (menu 4.5.1 + 4.5.4.1)	Are there signal from flowmeter?
		Are flow PPU correct?	Max. 10% change from given values.
		Does pressure equalization valves leak? (Not COMMANDER/EFC).	
Speed	Is there speed readout?	Use test menu. (menu 4.5.1 4.5.4.1)	Any signal from sensor?
		Check LED diode on sensor.	Sensor at metal = ON, Sensor at hole = OFF.
	Is speed stable?	Max. deviation ±0,15 km/h	Distance to wheel speed ring 4-5 mm?
			Is speed ring buckled?
			Does sensor sense middle of holes?
			Does speed ring vibrate when running?
Active boom width	Signal received?	Select boom width menu.	Correspond to actual boom width?
DynamicFluid4 pressure regulation valve	Does manual control work?	Turn valve to maximum.	Can the valve turn reverse, both at min. and max.?

11 - Fault finding

Checks for clogging

Clogging of valves and hoses should be avoided. If suspicious of clogging, the following checks are recommended

DANGER! As water will be flushed out, tests are to be done with a clean sprayer in order to avoid spot contamination and risk of personal injury.

Valve positions						
Suction SmartValve	**Pressure SmartValve**	**External fill valve**	**Agitation valve**	**Pump**	**Other**	**Verify**
 External fill	 To MainTank	 (Open)	Closed	Turned ON	Connect hose from external tank to External fill	Look in MainTank. Check that water exits from ejector
 From MainTank	 Pressure Empty	 (Closed)	Closed	Turned ON		Look in MainTank. Check that safety valve opens
 From MainTank	 Spraying	 (Closed)	Closed	Turned ON	Boom sections closed	Look in MainTank. Check that safety valve closes and does not leak water
 From MainTank	 Spraying	 (Closed)	Closed	Turned ON	Boom sections closed	Look in MainTank. Check that water exits pressure filter dump line
 From MainTank		 (Closed)		Turned ON		Look in MainTank. Check that water exits from agitation tube
 From MainTank		 (Closed)	Closed	Turned ON		Look in MainTank. Check that water exits from thin tube
 From MainTank		 (Open)	Closed	Turned ON	Close lid on MainTank. Remove cap on External filling coupler	Check that water comes out of External filling coupler
 From MainTank		 (Closed)	Closed	Turned OFF	Pull the 2 rinsing nozzles up from tank	Check by hand that rinse nozzles can rotate
 From MainTank		 (Closed)	Closed	Turned ON at low R.P.M.	Start pump, rum at low RPM	From tractor cab, confirm water exits rinse nozzles

Checks for external leak

If suspicious of external leaks:

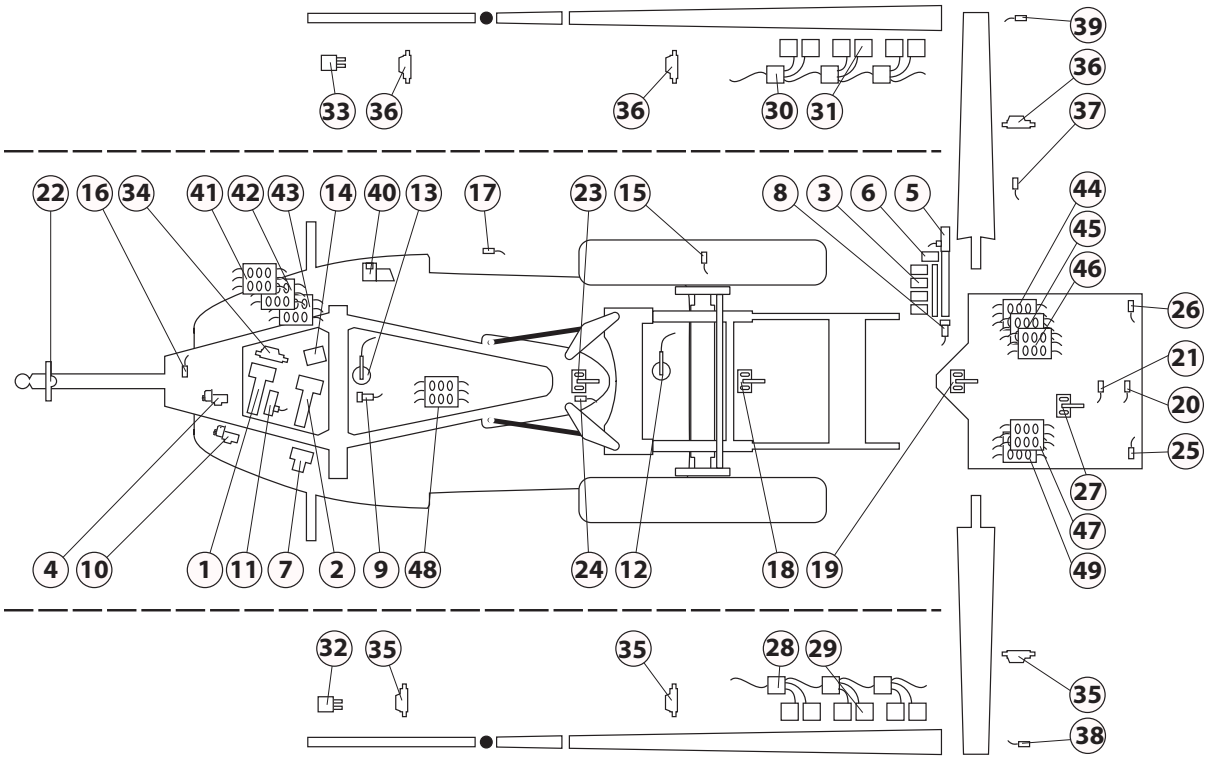
1. Clean sprayer, if necessary, as water will be flushed out later.

DANGER! As water will be flushed out, test is to be done with a clean sprayer, in order to avoid spot contamination and risk of personal injury.

2. Run a stationary FastFlush, and monitor if water exits sprayer in places other than the boom. In particular monitor area below sprayer frame.

Location of components (trailed sprayers)

A complete list of sensors on HARDI® COMMANDER sprayers. Other models will vary. Some sensors optional, depending on various possible configurations. The function of some sensors can be viewed in menu 4.7 Emergency track Align, others function can be viewed in the submenus of menu 4.5 Test of sensors.



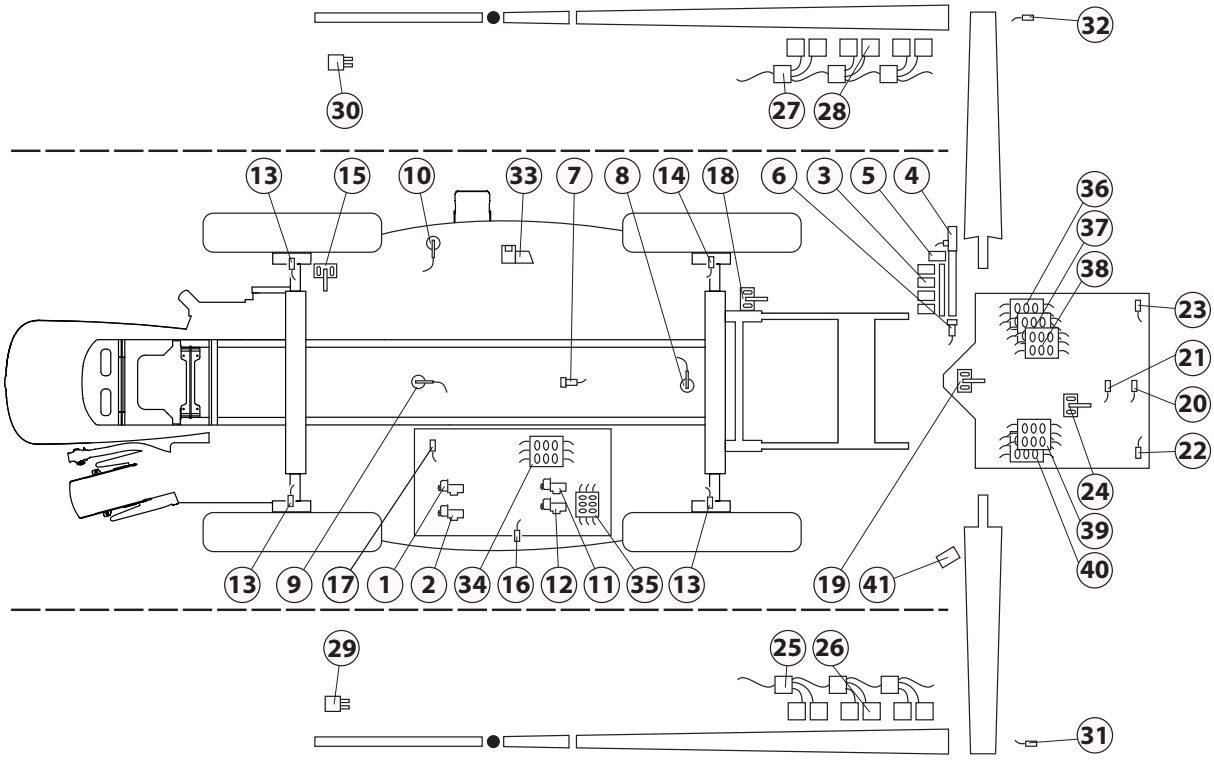
Sensor number	Description
1	Suction SmartValve
2	Pressure SmartValve
3	Distribution valves
4	Pressure control valve
5	Boom flow meter
6	Boom bypass valve
7	External filling valve
8	Pressure sensor
9	Main tank gauge
10	AutoAgitation valve
11	RinseTank flow meter
12	RinseTank full sensor
13	Main tank full sensor
14	Boost line valve
15	Forward speed sensor
16	PTO Pump speed sensor
17	FlexCapacity speed sensor
18	Paralift height sensor
19	Slant angle sensor
20	Pendulum lock sensor
21	Pendulum un-lock sensor
22	SafeTrack front sensor
23	SafeTrack rear sensor
24	SafeTrack lock sensor
25	Boom sensor Left

Sensor number	Description
26	Boom sensor Right
27	Dynamic sensor
28	PrimeFlow SMCU Left
29	PrimeFlow step motor Left
30	PrimeFlow SMCU Right
31	PrimeFlow step motor Right
32	End nozzle Left
33	End nozzle Right
34	TWIN fan speed actuator
35	TWIN angle actuator Left
36	TWIN angle actuator Right
37	TWIN Fan speed sensor
38	Middle fold lock sensor Left
39	Middle fold lock sensor Right
40	Foam marker compressor
41	JobCom
42	DAH PCB
43	PrimeFlow step-up transformer
44	9 sec. Central Junction box PCB
45	13 sec. Central Junction box PCB
46	PrimeFlow Cent. Junction box PCB
47	HY Cent. Junction box PCB
48	Dilution kit box PCB
49	TerraForce HY Junction box PCB

11 - Fault finding

Location of components (self-propelled sprayers)

A complete list of sensors on HARDI® SARITOR sprayers. Other models will vary. Some sensors optional, depending on various possible configurations. The function of some sensors can be viewed in the submenus of menu 4.5 Test of sensors.



Sensor number	Description
1	Main tank valve
2	Flush tank valve
3	Distribution valves
4	Boom flow meter
5	Boom bypass valve
6	Pressure sensor
7	Main tank gauge
8	Main tank full sensor
9	Hydraulic oil level sensor
10	Fuel level sensor
11	Rinse nozzle valve
12	AutoAgitation valve
13	Speed sensor
14	Speed & Temperature sensor
15	Angle sensor
16	Work station light switch
17	Pump speed sensor
18	Paralift height sensor
19	Slant angle sensor
20	Pendulum lock sensor
21	Pendulum un-lock sensor

Sensor number	Description
22	Boom sensor Left
23	Boom sensor Right
24	Dynamic sensor
25	PrimeFlow SMCU Left
26	PrimeFlow step motor Left
27	PrimeFlow SMCU Right
28	PrimeFlow step motor Right
29	End nozzle Left
30	End nozzle Right
31	Middle fold lock sensor Left
32	Middle fold lock sensor Right
33	Foam marker compressor
34	JobCom
35	PCB for external controls
36	9 sec. Central Junction box PCB
37	13 sec. Central Junction box PCB
38	PrimeFlow Cent. Junction box PCB
39	HY Cent. Junction box PCB
40	TerraForce HY Junction box PCB
41	External camera

Fault codes

Under these menus you can check if the communication is ok. This is used both by technicians and skilled operators.

To troubleshoot in field and see if CAN communication works, each computer unit has a LED, which indicates condition and status of this computer.

- 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.

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

NOTE! These are useful for service staff:

ID is the fault identifier and is the number shown in the display.

Pr is alert priority.

ID	Type	Text at display detail	Criteria for fault Operations disabled	Full screen Help text	Pr
01	Alarm	Sensor 12V supply failure	While the short circuit is present. SafeTrack shifted to manual. Auto is disabled.	Sensor 12V supply failure	1
02	Alarm	Sensor 5V supply failure	While the short circuit is present. SafeTrack shifted to manual. Auto is disabled.	Sensor 5V supply failure	2
03	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.	3
04	Alarm	Trapeze lock locked illegally	Lock is detected locked unintentionally. All SafeTrack keys are disabled. Manual tracking, "Align" and "Boom fold inner in" is only possible from menu 4.7.	Lock is detected released unintentionally. Missing hydraulic pressure on lock cylinder. Mis adjusted lock sensor. Manual tracking, "Align" and "Boom fold inner in" is only possible from menu 4.7.	4
05	Alarm	Trapeze lock not locking	Attempt to lock, but no "lock" signal on sensor input. All SafeTrack keys are disabled. Manual tracking, "Align" and "Boom fold inner in" is only possible from menu 4.7.	Attempt to lock, but no "lock" signal on sensor input. Lock sensor mis adjusted. Mechanical defect prevents lock to penetrate hole. Mis adjusted rear angle sensor. Manual tracking, "Align" and "Boom fold inner in" is only possible from menu 4.7.	12
06	Alarm	Trapeze lock released illegally	Lock is detected released unintentionally. All SafeTrack keys are disabled. Manual tracking, "Align" and "Boom fold inner in" is only possible from menu 4.7.	Lock is detected released unintentionally. Poor lock sensor adjustment. Lock cylinder fallen off. Manual tracking, "Align" and "Boom fold inner in" is only possible from menu 4.7.	13
07	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. Mis adjusted lock sensor. Mechanical defect.	14
08	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.	15

11 - Fault finding

ID	Type	Text at display detail	Criteria for fault Operations disabled	Full screen Help text	Pr
09	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. Pressing "Enter will remove the alarm from the display until the system has been rebooted.	16
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.	17
11	Alarm	Agitation valve fault	Error detection not active, profet error detection not used. On fault following occurs: AutoWash disabled AutoFill disabled Used by Autowash/AutoFill	Agitation valve fault. Motor disconnected. Motor short circuit or blocked. Sensor failing.	18
12	Alarm	Reserved	Reserved, replaced by ID154-159 Error detection not active, profet error detection not used. On fault following occurs: AutoWash allowed AutoFill disabled Clear alarm by reboot Used by Autowash/AutoFill	Fill valve fault. Motor disconnected. Motor short circuit or blocked. Sensor failing.	19
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. Used by Autowash/AutoFill	Illegal flow is detected in Sections line or in RinseTank line.	20
14	Alarm	No RinseTank flow	Error detection. On fault following occurs: AutoWash disabled. AutoFill allowed. Clear alarm by RinseTank full switch or flow from RinseTank Used by Autowash/AutoFill	RinseTank empty or no rinse water flow due to other reasons.	21
15	Alarm	Reserved	Reserved, replaced by ID154-159 Error detection not active, profet error detection not used. On fault following occurs: AutoWash disabled AutoFill disabled Used by Autowash/AutoFill	PressureValve fault. Motor disconnected. Motor short circuit or blocked. Sensor failing.	22
16	Alarm	Reserved	Reserved, replaced by ID141-145 Error detection not active, profet error detection not used. On fault following occurs: AutoWash disabled AutoFill allowed Used by Autowash/AutoFill	Regulation valve fault. Motor disconnected. Motor short circuit or blocked. Sensor failing.	23

ID	Type	Text at display detail	Criteria for fault Operations disabled	Full screen Help text	Pr
17	Alarm	Reserved	Reserved, replaced by ID154-159 Error detection not active, profet error detection not used. On fault following occurs: AutoWash disabled AutoFill disabled Used by Autowash/AutoFill	SuctionValve fault. Motor disconnected. Motor short circuited or blocked. Sensor failing.	24
18	Alarm	TankGauge fault	When TankGauge is enabled and frequency is below 50Hz. AutoWash is disabled. AutoFill is disabled. Used by Autowash/AutoFill	TankGauge fault. TankGauge frequency is detected below 50Hz.	25
19	Warning	Software error Terminal	Close hydraulic valves	Turn off PTO to stop spray. Turn off power to stop hydraulics.	26
20	Warning	Software error JobCom	Close hydraulic valves	Turn off PTO to stop spray. Turn off power to stop hydraulics.	27
21	Warning	Software error Grip	Close hydraulic valves	Turn off PTO to stop spray. Turn off power to stop hydraulics.	28
22	Warning	Software error SetBox	Close hydraulic valves	Turn off PTO to stop spray. Turn off power to stop hydraulics.	29
23	Warning	Software error FluidBox		Turn off PTO to stop spray. Turn off power to stop hydraulics.	30
24	Warning	CAN bus failing to JobCom	Close hydraulic valves	Turn off PTO to stop spray. Turn off power to stop hydraulics.	31
25	Warning	CAN bus failing to SetBox	Close hydraulic valves	Turn off PTO to stop spray. Turn off power to stop hydraulics.	32
26	Warning	CAN bus failing to Grip	Close hydraulic valves	Turn off PTO to stop spray. Turn off power to stop hydraulics.	33
27	Warning	CAN bus failing to FluidBox		Turn off PTO to stop spray. Turn off power to stop hydraulics.	34
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.	38
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. In half steer mode: Risk of bending folded side. Contact service.	39
30	Illegal action	Main on/off is on	When pressing softkey for BoomFlush, FastFlush, MultiRinse while Main on off is on. Keypress does not start process. Used by Autowash/AutoFill	Main on off is on. Turn Main ON OFF to off before starting AutoWash.	40
31	Illegal action	MainTank not empty	When pressing softkey for BoomFlush, FastFlush, MultiRinse while MainTank is not empty. Keypress does not start process. Used by Autowash/AutoFill	MainTank not empty. AutoWash cannot be started.	41
32	Illegal action	No rinse water	When pressing softkey for either BoomFlush, FastFlush, MultiRinse while RinseTank is calculated too empty for that program. Keypress does not start process. Used by Autowash/AutoFill	Not enough rinse water for selected program. AutoWash cannot be started.	42

11 - Fault finding

ID	Type	Text at display detail	Criteria for fault Operations disabled	Full screen Help text	Pr
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!	43
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. Used by Autowash/AutoFill	Double pump must be started to flush hoses. Stop and start Double pump with hydraulic lever, as Warning prompts you to.	44
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. Used by Autowash/AutoFill	Double pump must be stopped to avoid chemical in boom. Stop and start Double pump with hydraulic lever, as Warning prompts you to.	45
36	Waiting	Pause	Upon press of softkey or low or high PTO pump RPM or Flexcap RPM See also screen layouts Used by Autowash/AutoFill	AutoWash is paused by keypress.	46
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.	47
38	Warning	Output failing to sect 1	Detected by H-bridge on I2C bus	Output failing to sect 1	48
39	Warning	Output failing to sect 2	Detected by H-bridge on I2C bus	Output failing to sect 2	49
40	Warning	Output failing to sect 3	Detected by H-bridge on I2C bus	Output failing to sect 3	50
41	Warning	Output failing to sect 4	Detected by H-bridge on I2C bus	Output failing to sect 4	51
42	Warning	Output failing to sect 5	Detected by H-bridge on I2C bus	Output failing to sect 5	52
43	Warning	Output failing to sect 6	Detected by H-bridge on I2C bus	Output failing to sect 6	53
44	Warning	Output failing to sect 7	Detected by H-bridge on I2C bus	Output failing to sect 7	54
45	Warning	Output failing to sect 8	Detected by H-bridge on I2C bus	Output failing to sect 8	55
46	Warning	Output failing to sect 9	Detected by H-bridge on I2C bus	Output failing to sect 9	56
47	Warning	Output failing to sect 10	Detected by H-bridge on I2C bus	Output failing to sect 10	57
48	Warning	Output failing to sect 11	Detected by H-bridge on I2C bus	Output failing to sect 11	58
49	Warning	Output failing to sect 12	Detected by H-bridge on I2C bus	Output failing to sect 12	59
50	Warning	Output failing to sect 13	Detected by H-bridge on I2C bus	Output failing to sect 13	60
51	Warning	Output failing to bypass			61
52	Warning	Electronic fuse 1 is on	Voltage drop over electrothermal fuse		62
53	Warning	Electronic fuse 2 is on	Voltage drop over electrothermal fuse		63
54	Warning	Electronic fuse 3 is on	Voltage drop over electrothermal fuse		64
55	Warning	Electronic fuse 4 is on	Voltage drop over electrothermal fuse		65
56	Warning	RinseTank not full	When main tank has been filled and rinse tank is empty.	Remember to re-fill rinse tank.	66
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.	67
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.	68
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.	69
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.	70

ID	Type	Text at display detail	Criteria for fault Operations disabled	Full screen Help text	Pr
61	Warning	Speed too high	Speed too high (limit set in menu 2.5.5.1).	Decrease speed. Pressure will be too high.	71
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.	72
63	Warning	Appl. 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.	73
64	Warning	Appl. volume too low	Application volume too low (% limit set in menu).	Decrease speed or change nozzle size. Check regulation valve.	74
65	Warning	Fan speed too high	Fan speed too high (limit set in menu 2.5.4.1).	Reduce fan speed	75
66	Warning	Fan speed too low	Fan speed too low (limit set in menu 2.5.4.2).	Increase fan speed	76
67	Warning	PTO speed too low	PTO rev. too low (limit set in menu).	Increase PTO speed	77
68	Warning	PTO speed too high	PTO rev. too high (limit set in menu).	Decrease PTO speed	78
69	Warning	Ladder not up		Raise ladder, to avoid damage to ladder or crop.	79
70	Warning	Wind Speed too high	Wind Speed too high (limit set in menu).	Stop spraying or consider other nozzle types like HARDI® LowDrift.	80
71	Warning				81
72	Warning				82
73	Warning				83
74	Warning				84
75	Warning	Opt. sensor 1 too high	Limit set in menu.	This will be help text	85
76	Warning	Opt. sensor 1 too low	Limit set in menu.	This will be help text	86
77	Warning	Opt. sensor 2 too high	Limit set in menu.	This will be help text	87
78	Warning	Opt. sensor 2 too low	Limit set in menu.	This will be help text	88
79	Warning	Opt. sensor 3 too high	Limit set in menu.	This will be help text	89
80	Warning	Opt. sensor 3 too low	Limit set in menu.	This will be help text	90
81	Warning	Opt. sensor 4 too high	Limit set in menu.	This will be help text	91
82	Warning	Opt. sensor 4 too low	Limit set in menu.	This will be help text	92
83	Reminder	Aborted by keypress	Upon press of softkey Used by Autowash/AutoFill	AutoWash is Aborted by keypress.	93
84	Reminder	Aborted by exception #	Aborted by exception, then show number from AW source code Previously AutoWash completed	AutoWash is completed	94
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.	95
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.	96
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.	97
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.	98
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 other- wise see operators manual.	99

ID	Type	Text at display detail	Criteria for fault Operations disabled	Full screen Help text	Pr
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 lubrication points otherwise see operators' manual.	100
91	Reminder	Miscellaneous service	Periodically, period defined in extended menu. (Only checked at power up)	See operators' manual for specific sprayer service.	101
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.	102
93	Reminder	Stop watch is zero		Stop watch is zero	103
94	Changed	Track in manual		Operator has put Track in manual	104
95	Changed	Track in auto		Operator has put Track in auto	105
96	Changed	Track is locked		Operator has locked Track	106
97	Changed	Reversing		Operator is reversing	107
98	Changed	Track unlocked		Lock is detected released. Hydraulic pressure established. Mis adjusted lock sensor.	108
99	Alarm	PrimeFlow data cable weakness	JobCom does not receive the data it sends. Shift the relay to Full duplex (transmit to both ends). Data cable defect is only detected at Half duplex (listen only right end). No further Data cable defect are detected at Full duplex (transmit to both ends).	PrimeFlow bus cable fault is detected. A failure handling circuit is enabled. PrimeFlow is in full operation.	35
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 volts.	A fuse is open or too many rapid shifts on and off of sections has drained the power supply.	36
101	Warning	PrimeFlow power cable defect	Low power warning from SMCU, when supply is re-established. 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.	Poor power wiring to PrimeFlow computers. One of the 2 power lines are disconnected or connectors are corroded and gives high resistance.	109
102	Warning	PrimeFlow computer defect	SMCU does not reply on status. No status request while "Low voltage on supercap" occurs.	Internal fault in PrimeFlow computer. Can also be caused by 2 or more defects in PrimeFlow data cable. Check for PrimeFlow data cable weakness.	110
103	Warning	Fold with unlocked pendulum	When pressing FoldCenterIn, FoldLeftIn or FoldRightIn and pendulum is unlocked.	Fold with unlocked pendulum.	111
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.	112
105	Changed	Agitation in Auto	Forward speed > 0.5 km/h and Main On/Off = On	Agitation in Auto	113
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. Alarm should not appear at self test at start up. Pressure regulation is unchanged.	JobCom detected that pressure regulation valve does not turn and cannot close and increase pressure and flow any further. Increase PTO RPM. Review flow used for agitation. Check for internal leakages.	114

ID	Type	Text at display detail	Criteria for fault Operations disabled	Full screen Help text	Pr
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. The alarm is generated, if the sensor signal is less than0.2 Volt or exceeds 4.8 Volt.	Check sensor and cable on pendulum. Disable HeadLandAssist. Disable Slant in steps.	115
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 than0.2 Volt or exceeds 4.8 Volt.		116
109	Alarm	Pressure sensor alarm	Alarm is active when Menu E8.1.7.1 is "Active" 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.	117
110	Alarm	JobCom Resetting		Refer to HC 6500 service manual.	124
111	Alarm	JobCom Resetting Done		Refer to HC 6500 service manual.	125
112	Changed	Flat 1 Level 1 Hilly 5	When TERRA FORCE boom hydraulics set-up has been selected in menu E8.6.3.7, the setbox TWIN buttons are dedicated to select the Dynamic center setting. The information pops up when a button has been pushed.	Defines current Dynamic center setting for the TERRA FORCE boom. Flat means the boom is free hanging. Hilly means the boom will follow the sprayer movements.	118
113	Changed	Flat 1 Level 2 Hilly 5	When TERRA FORCE boom hydraulics set-up has been selected in menu E8.6.3.7, the setbox TWIN buttons are dedicated to select the Dynamic center setting. The information pops up when a button has been pushed.	Defines current Dynamic center setting for the TERRA FORCE boom. Flat means the boom is free hanging. Hilly means the boom will follow the sprayer movements.	119
114	Changed	Flat 1 Level 3 Hilly 5	When TERRA FORCE boom hydraulics set-up has been selected in menu E8.6.3.7, the setbox TWIN buttons are dedicated to select the Dynamic center setting. The information pops up when a button has been pushed.	Defines current Dynamic center setting for the TERRA FORCE boom. Flat means the boom is free hanging. Hilly means the boom will follow the sprayer movements.	120
115	Changed	Flat 1 Level 4 Hilly 5	When TERRA FORCE boom hydraulics set-up has been selected in menu E8.6.3.7, the setbox TWIN buttons are dedicated to select the Dynamic center setting. The information pops up when a button has been pushed.	Defines current Dynamic center setting for the TERRA FORCE boom. Flat means the boom is free hanging. Hilly means the boom will follow the sprayer movements.	121
116	Changed	Flat 1 Level 5 Hilly 5	When TERRA FORCE boom hydraulics set-up has been selected in menu E8.6.3.7, the setbox TWIN buttons are dedicated to select the Dynamic center setting. The information pops up when a button has been pushed.	Defines current Dynamic center setting for the TERRA FORCE boom. Flat means the boom is free hanging. Hilly means the boom will follow the sprayer movements.	122
117	Warning	D-center incorrect position	Time-out on sensor signal AI25. TERRA FORCE boom hydraulics set-up has been selected in menu E8.6.3.7 Buttons has been activated to move the Dynamic center. The selected setting has not been reached within 10 seconds. Reset by keypress "enter" or attempt to move Dynamic center.	Attempt to move Dynamic center cylinder did not succeed within the given time frame. Check the hydraulics connections and pressure. Check Dynamic center position sensor.	37
118	Warning	Pendulum locking failed.	Time-out on sensor signal AI1 when attempting to lock. See table "TerraForce Pendulum lock" in terminal specification xxxx Reset by attempt to lock.	Attempt to move Pendulum lock cylinder did not succeed within the given time frame. Check the hydraulics connections and pressure. Check Pendulum lock position sensor adjustment.	5

ID	Type	Text at display detail	Criteria for fault Operations disabled	Full screen Help text	Pr
119	Warning	Pendulum release failed.	Time-out on sensor signal AI1 (E0.7.4 setting) when attempting to unlock. See table "TerraForce Pendulum lock" in terminal specification xxxx Reset by attempt to release.	Pendulum is locked unintentionally. The suspension will be damaged. Check the hydraulics connections and pressure. Check Pendulum lock position sensor adjustment.	6
120	Warning	STOP! PENDULUM LOCKED!	Time-out on sensor signal AI1 (E0.7.4 setting) when attempting to unlock and speed >E0.7.2 setting. See table "TerraForce Pendulum lock" in terminal specification ver 35 Reset by removal of coarse (either unlock succeeded or speed<E0.7.2).	Pendulum is locked unintentionally when attempting to spray. The suspension will be damaged. Check the hydraulics connections and pressure. Check Pendulum lock position sensor adjustment.	7
121	Alarm	Pendulum lock sensor.	When TERRA FORCE boom hydraulics set-up has been selected in menu E8.6.3.7 The alarm is generated: • if the sensor signal on AI1 is less than 0,5V. • Illegal transition. See table "TerraForce Pendulum lock" in terminal specification ver 35	No or wrong signal from sensor. Shorted or disconnected. Check Pendulum lock sensor adjustment and/or connection.	8
122	Warning	Dynamic Center sensor.	When TERRA FORCE boom hydraulics set-up has been selected in menu E8.6.3.7 The alarm is generated, if the sensor signal on AI25 is less than 0,2V or exceeds 4,8V. Reset by keypress "enter".	Signal from sensor out of range. Shorted or disconnected. Check Dynamic center position sensor adjustment and/or connection.	11
123	Warning	Folding not allowed.	Attempt to fold when speed >E0.7.2 km/h. Folding blocked. Reset when speed <E0.7.2 km/h or when fold buttons are released.	It is not allowed to fold or unfold the boom while driving. Stop the vehicle.	123
124	Reminder	ISObus terminal recovered			126
125	Reminder	ISObus bridge recovered			127
126	Reminder	No Dilution	Appears when dilution kit function is activated, and no outputs are active.	Fluid systems works normally.	128
127	Reminder	Tank Dilution	Appears when dilution kit function is activated, and tank output is active.	Suction from rinse tank. Flush tank through tank cleaning nozzles.	129
128	Reminder	Boom Dilution	Appears when dilution kit function is activated, and Boom output is active.	Suction from rinse tank. If nozzles are open - flush feed hoses. If nozzles are closed - flush dump hose.	130
129	Warning	Pump over speeding	Pump RPM exceed 5000 RPM.	Pump RPM exceed manufacturer's limitation.	131
130	Warning	Vehicle over speeding	Forward speed exceed setting in E0 menu, and MainFlowOnOff is on.	Vehicle over speeding while spraying.	132
131	Warning	Boom not in transport.	When TERRA FORCE boom hydraulics set-up has been selected in menu E8.6.3.7+8 The alarm is generated, if an attempt to bring the boom into transport position failed, or if the user forgot to bring it there.	Place boom in transport position before driving. Check transport lock function. Check boom height sensor.	10
132	Illegal action	One function only!	When TERRA FORCE boom hydraulics set-up has been selected in menu E8.6.3.7+8 Appears on TERRA FORCE booms when the user tries to us more than one function at a time.	It is not allowed to use multiple folding buttons/ functions simultaneously.	133
133	Illegal action	Unfold inner wing.	When TERRA FORCE boom hydraulics set-up has been selected in menu E8.6.3.7+8. Wrong folding sequence.	Do not attempt to fold outer wings, if inner wing is not fully unfolded.	134
134	Illegal action	Keep folding 1st outer wing.	When TERRA FORCE boom hydraulics set-up has been selected in menu E8.6.3.7+8. Wrong folding sequence.	Finish the folding of 1st outer wing.	135

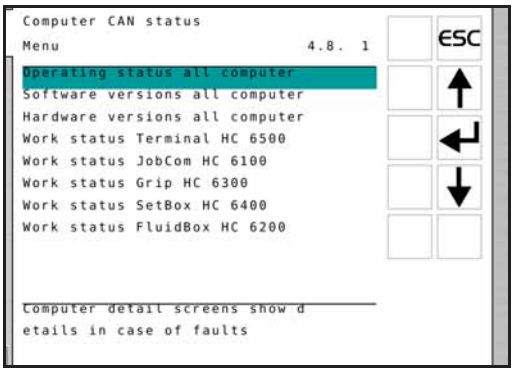
ID	Type	Text at display detail	Criteria for fault Operations disabled	Full screen Help text	Pr
135	Illegal action	Keep folding 2nd outer wing.	When TERRA FORCE boom hydraulics set-up has been selected in menu E8.6.3.7+8. Wrong folding sequence.	Finish the folding of 2nd outer wing.	136
136	Warning	Lift the boom.	When TERRA FORCE boom hydraulics set-up has been selected in menu E8.6.3.7+8. The boom lift position is too low to ensure proper function of the transport lock.	The boom lift position is too low to ensure proper function of the transport lock.	137
137	Warning	Boom not in transport.	See state machine table "TERRA FORCE transport lock and suspension relief".	Place the boom correctly in transport position before driving. Check transport lock function. Check boom height sensor.	138
138	Reminder	Mismatch Box and setup.	When setup in E8.5.8 Grip, SetBox, armrest does not match jumper positions in SetBox PCB for armrest and Outside switches. Reminder is not sent when boxes are not connected or software has no jumper positions PG	Setup in E8.5.8 Grip, SetBox, armrest does not match jumper positions in SetBox PCB for armrest and Outside switches.	139
139	Alarm	Dynamic center sensor.	When dynamic center function is enabled in menu E.8.6.7		139
140	Alarm	Pendulum unlock sensor.	When TERRA FORCE boom hydraulics set-up has been selected in menu E8.6.3.7 The alarm is generated: • if the sensor signal on AI5 is less than 0,5V. • Illegal transition. See table "TerraForce Pendulum lock" in terminal specification ver 53	No or wrong signal from sensor. Shorted or disconnected. Check Pendulum unlock sensor adjustment and/or connection.	9
141	Warning	Reg. Valve sensor fault.			140
142	Warning	Boom flow sensor fault.			141
143	Warning	Boom press sensor fault.			142
144	Warning	Pump sensor fault.	Used by Autowash/AutoFill		143
145	Warning	Reg. Valve motor fault.			144
146	Warning	Agitation sensor fault	Not used 11 Alarm Agitation valve fault is used instead		145
147	Warning	Agitation motor fault	Not used 11 Alarm Agitation valve fault is used instead		146
148	Warning	Centrifugal valve calib failed	When Regulation SW cannot detect and calculate X axis crossing or slope of hydraulic valve characteristic Used by Regulation		
149	Warning	Stack overflow			148
150	Warning	PF motor blocked #xxx	PrimeFlow. When command 09h is "Status advanced" is read, each motor can be detected blocked, shorted or disconnected. The "#xxx" indicates the actual nozzle number.	A PrimeFlow motor is detected blocked. Inspect motor and nozzle condition. Clean or replace valve if necessary.	149
151	Warning	PF motor short #xxx	PrimeFlow. When command 09h is "Status advanced" is read, each motor can be detected blocked, shorted or disconnected. The "#xxx" indicates the actual nozzle number.	A PrimeFlow motor is detected shorted. Inspect motor and connector condition.	150
152	Warning	PF motor disconnect #xxx	PrimeFlow. When command 09h is "Status advanced" is read, each motor can be detected blocked, shorted or disconnected. The "#xxx" indicates the actual nozzle number.	A PrimeFlow motor is detected disconnected. Inspect motor, SMCU and connector condition.	151

ID	Type	Text at display detail	Criteria for fault Operations disabled	Full screen Help text	Pr
153	Reminder	AutoWash completed xx cycles	When program is completed Used by Autowash/AutoFill	AutoWash is completed AUTOWASH_CYCLE_COMPLITED	
154	Warning	FastFiller valve motor fault	Sensor does not change 0.5 volt when motor is activated for 1 sec Or Valve do not get into position within 4 sec Or verify speed 50 mV /100 msec Beware of blind zone See also alert ID13 Used by Autowash/AutoFill	FAST_FILL_VALVE_MOT_FAULT	
155	Warning	FastFiller valve sensor fault	Sensor changes more than 100 mV when motor is not activated Or Speed below 50 mV /100 msec Used by Autowash/AutoFill	FAST_FILL_VALVE_SENS_FAULT	
156	Warning	PressureValve motor fault	Sensor does not change when motor is activated Used by Autowash/AutoFill	PRESSURE_VALVE_MOT_FAULT	
157	Warning	PressureValve sensor fault	Sensor changes when motor is not activated Used by Autowash/AutoFill	PRESSURE_VALVE_SENS_FAULT	
158	Warning	SuctionValve motor fault	Sensor does not change when motor is activated Used by Autowash/AutoFill	SUCTION_VALVE_MOT_FAULT	
159	Warning	Suction Valve sensor fault	Sensor changes when motor is not activated Used by Autowash/AutoFill	SUCTION_VALVE_SENS_FAULT	
160	Alarm	Illegal AutoWash Setup	Illegal pumps chosen Autowash will not start (preconditions not fulfilled) Used by Autowash/AutoFill	ILLEGAL_AWASH_SETUP	
161	Warning	Pump RPM too low Increase	Pump RPM is below table limits Increase to go to Pause Used by Autowash/AutoFill	PUMP_RPM_TOO_LOW	
162	Warning	Pump RPM too high Decrease	Pump RPM is above table limits Decrease to go to Pause Used by Autowash/AutoFill	PUMP_RPM_TOO_HIGH	
163	Warning	Increase pump flow	With EFC or PrimeFlow: When valve is closed and regulator is in state 6x With EVC: When valve is in closed end stop and flow is over threshold Used by Regulation	INC_PUMP_FLOW,	
164	Warning	Reduce pump flow	With EFC or PrimeFlow: When valve is open and regulator is in state 6x With EVC: When valve is in open end stop and flow is over threshold Used by Regulation	RED_PUMP_FLOW,	
165	Warning	Jobcom Fram defect	Write data to FRAM then read If read data is different from write data Clear alarm by power off p power on		

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.



ATTENTION! See also "Menu 4.7 Emergency" on page 8.3.

Operation when a sensor fails

When one of the sensors for RPM, flow or pressure fails, the system will work in a limp home mode with reduced, though acceptable, performance. One of the alarm ID's between 140 to 147 will be triggered in the controller display. See also "Fault codes" on page 11.5.

- In the auto mode, the system will not work with 2 failing sensors, hence the operator should repair the failing sensor as soon as possible.
- The pressure regulation can use both wheel speed sensor on trailer and GPS speed via ISOBUS.

NOTE! SafeTrack only works with wheel speed sensor.

Pressure regulation angle sensor works both as a feed back to the computer and as the end stop switch. If angle sensor fails, the operator can continue turning regulation valve past the completely closed position.

Failure in the sensors below will cause an inaccurate calculation of the volume rate when spraying. In order to be able to end a spray job when a sensor fails, do the following:

RPM	Flow	Pressure	Speed	Valve angle	Mode for regulation	Extra actions for operator
Use	Use	Use	Use	Use	Full performance	None
Defect	Use	Use	Use	Use	Reduced performance	None
Ignore	Defect	Use	Use	Use	Reduced performance	Setup new size when changing nozzle, see "Menu 3.4.3 Nozzle size flow at 45 psi" on page 7.10.
Defect	Defect	Use	Use	Use	Reduced performance	Setup new size when changing nozzle, see "Menu 3.4.3 Nozzle size flow at 45 psi" on page 7.10.
Ignore	Use	Defect	Use	Use	Reduced performance	Setup new size when changing nozzle, see "Menu 3.4.3 Nozzle size flow at 45 psi" on page 7.10.
Defect	Use	Defect	Use	Use	Reduced performance	Setup new size when changing nozzle, see "Menu 3.4.3 Nozzle size flow at 45 psi" on page 7.10
Use	Use	Use	Defect	Use	Spray at constant speed	Keep sprayer at constant driving speed. Type in simulated sprayer speed, "Menu 3.4.2 Simulated speed value" on page 7.9.
Ignore	Defect	Defect	Ignore	Use	Manual only	Adjust pressure after mechanical pressure gauge.
Ignore	Ignore	Ignore	Ignore	Defect	Manual only. Regulation valve can pass end stop. I.e. when continuing after it was closed, it opens again.	Adjust pressure after mechanical pressure gauge. Check for passing end stop of valve. Compensate for sections change.

Fluid system test

1. Close the main ON/OFF valve.
2. Close the regulation valve by pressing ⊕ button to increase the pressure. Yellow diode lights on the regulation valve.
3. Close the agitation valve.
4. Close the pressure filter bypass valve.
5. Set pump from 250 to 300 RPM, engine in idle speed.
6. Now all water from pump should pass boom flow sensor.
7. Pump condition and possible internal valve leakages can be checked by comparing:

- Menu 4.5.5.3.3 Pump calc flow. This menu shows the calculated flow from the pump.
- Menu 4.5.5.3.6 Meas boom flow. This menu shows the actual measured flow through the flow sensor.

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 fertilizer. 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 formula below can be used to "fine tune" the flow transducer PPU.

$$\text{New PPU} = \frac{\text{Original PPU} \times \text{Displayed Volume}}{\text{Sprayed Volume}}$$

For example, the spray tank is filled with 1000 gallons of spray liquid.

When sprayed out, the display showed a total of 900 gallons. (Original PPU = 485.0)

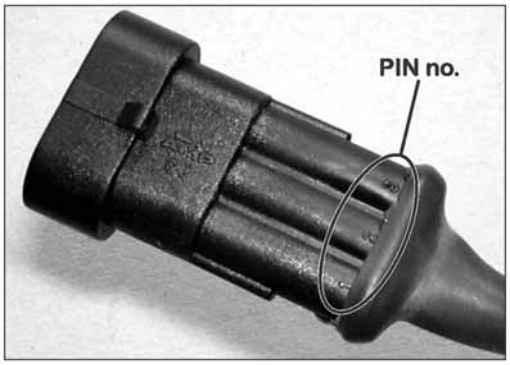
$$\text{New PPU} = \frac{485.0 \text{ PPU} \times 900 \text{ Gallons}}{1000 \text{ Gallons}} = 436.5 \text{ PPU}$$

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	Color coding
1	Negative	Black
2	Positive	Brown
3	Signal	Blue



12 - Testing and fine tuning

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 approximately 8.0 +/- 1 volt with the diode on and 0.3 +/- 0.1 volt with the diode off with every second magnet.

Testing speed transducer

This transducer is used for speed, Twin speed, Boom fold, SafeTrack, Main pump/FlexCapacity RPM.

- 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 within 1/8" to 3/16" (3 to 5 mm) from 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:	16Volt DC
Maximum peak:	28 Volt DC
Ambient temperature:	23°F to 158°F (– 5°C to + 70°C)
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	0.3 mph (0.5 km/h)

Flow ranges for the flow transducers

Housing	Housing identification (A)	Flow range gpm.	Orifice mm	PPU value
S/67	One outside groove	2-30	13.5	485.00
S/67	No groove	4-70	20.0	225.00
S/67	Two outside grooves	20-160	36.0	60.00

Pressure drop over 13.5 mm orifice is 15 psi at 40 gpm.

13 - Technical specifications

Electrical connections

Types of plugs and fuses

Fuses are located into the JobCom:

- 15 A auto fuse
- TWIN versions also 2x10 A auto fuse.

Breakout PCB:

- 2x 10 A auto fuse.

DAH PCB:

- 10 A slow blow fuse.

Plugs

- AMP Super Seal 1.5 with 2 and 3 pins.
- 13 pin plug ISO 11446.
- DAH: DB25F and DB37F connector.
- 13 pin ISO 11446M.
- ISOBUS: 9 pin IBBC F connector.

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.

13 - Technical specifications

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			

Warranty policy and conditions

HARDI® NORTH AMERICA INC. , 1500 West 76th Street, Davenport, Iowa, USA hereinafter called "HARDI®", offers the following limited warranty in accordance with the provisions below to each original retail purchaser of its own manufacturer, from an authorized HARDI® dealer that such equipment is at the time of delivery to such purchaser, free from defects in material and workmanship and that such equipment will be warranted for a period of one year from the time of delivery to the end user, providing the machine is used and serviced in accordance with the recommendations in the Operator's Manual and is operated under normal farm conditions.

1. This limited warranty is subject to the following exceptions:

   a)This warranty will be withdrawn if any equipment has been used for purposes other than for which it was intended or if it has been misused, neglected, or damaged by accident, let out on hire or furnished by a rental agency. Nor can claims be accepted if parts other than those manufactured by HARDI® have been incorporated in any of our equipment. Further, HARDI® shall not be responsible for damage in transit or handling by any common carrier and under no circumstances within or without the warranty period will HARDI® be liable for damages of loss of use, or damages resulting from delay or any consequential damage.

2. We cannot be held responsible for loss of livestock, loss of crops, loss because of delays in harvesting or any other expense or loss incurred for labor, supplies, substitute machinery, rental for any other reason, or for injuries either to the owner or to a third party, nor can we be called upon to be responsible for labor charges, other than originally agreed, incurred in the removal or replacement of components.

3. The customer will be responsible for and bear the costs of:

   a)Normal maintenance such as greasing, maintenance of oil levels, minor adjustments including the boom.

   b)Transportation of any HARDI® product to and from where the warranty work is to be performed.

   c)Dealer travel time to and from the machine or to deliver and return the machine from the service workshop for repair unless otherwise dictated by state law.

   d)Dealer traveling costs.

4. This warranty will not apply to any product which is altered or modified without the express written permission of the HARDI® Service and Engineering Departments and/or repaired by anyone other than an Authorized HARDI® Dealer.

5. Warranty is dependent upon the strict observance by the purchaser of the following provisions:

   a)That this warranty may not be assigned or transferred to anyone.

   b)That the Warranty Registration Certificate has been correctly completed by dealer and purchaser with their names and addresses, dated, signed and returned to the appropriate address as given on the Warranty Registration Certificate within 30 days of delivery to the purchaser.

   c)That all safety instructions in the operator's manual shall be followed and all safety guards regularly inspected and replaced where necessary.

6. No warranty is given on second-hand products and none is implied.

7. HARDI® reserves the right to incorporate any change in design in its products without obligation to make such changes on units previously manufactured.

8. The judgement of the HARDI® Service Department in all cases of claims under this warranty shall be final and conclusive and the purchaser agrees to accept its decisions on all questions as to defect and the repair or exchange of any part or parts.

9. No employee or representative is authorized to change this warranty in any way or grant any other warranty unless such change is made in writing and signed by the CEO in the Davenport office. Approval of warranty is the responsibility of the HARDI® Service Department.

10. Any warranty work performed which will exceed $1000.00 MUST be approved IN ADVANCE by the Service Department. Warranty claims filed without prior approval will be returned.
11. Claims under this policy MUST be filed with the HARDI® Service Department within thirty (30) days of when the work is performed or warranty shall be void unless prior arrangements are made.
12. Parts which are requested for return by the HARDI® Service Department must be returned prepaid within thirty (30) days for warranty settlement.
13. Warranty claims must be COMPLETELY filled out including part numbers and quantities or claims will be returned to the submitting dealer.

DISCLAIMER OF FURTHER WARRANTY

THERE ARE NO WARRANTIES, EXPRESSED OR IMPLIED, EXCEPT AS SET FORTH ABOVE. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION OF THE PRODUCT CONTAINED HEREIN. IN NO EVENT SHALL THE COMPANY BE LIABLE FOR INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES (SUCH AS LOSS OF ANTICIPATED PROFITS) IN CONNECTION WITH THE RETAIL PURCHASER'S USE OF THE PRODUCT.

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