

HARDI PILOT 3880
DPE- GPS LINK
Instruction book
670816-GB-2002/02 (ver. 2.13)

Table of Contents

Table of contents	2
EC Declaration of Conformity	3
Operator safety	4
Liability claim	4
Description	5
HP 3880 display linked to external DGPS tractor terminal	5
External setting of application rate for variable rate application	6
Setting up as a conventional HP 3880 (internal volume setting)	6
GPS and the function of HARDI PILOT – GPS LINK	7
Adjusting by change of pressure	8
Be aware of drift!	8
Site specific use pesticides	9
How to make application maps	10
Field borderline	10
Herbicide maps	11
Fungicide maps	12
Mixing the chemical concentration in the sprayer tank	15

EC Declaration of Conformity

Manufacturer,
HARDI INTERNATIONAL A/S
Helgeshøj Allé 38
DK 2630 Taastrup
Denmark

Importer,

declare that the following product;

.....
.....

Adhere extra shipping package labels to inside cover.

Was manufactured in conformity with the provisions in the
EMC directive 89/336/EEC, EN 50081-1 (generic emission)
and EN 50082-1 (generic immunity).

Operator safety



Watch for this symbol. It means note, warning, and caution. Your safety is involved so be alert



Note the following recommended precautions and safe operating practices.



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



Disconnect electrical power before disconnecting the display or external terminals.

Liability claim

The use of appropriate doses lower than recommended on pesticide labels is fully on the responsibility of the operator.

HARDI INTERNATIONAL A/S takes no responsibility for missing efficacy or loss due to the use of reduced application rates.

HARDI INTERNATIONAL A/S has no responsibility for any malfunction caused by the external terminal transmitting an RS232 signal to the HARDI PILOT 3880 DPE - GPS

We congratulate you for choosing a HARDI Plant protection product. The reliability and efficiency of this product depend on your care. **Read and pay attention** to this instruction book. It contains information for the efficient use and long life of this quality product.

HARDI PILOT 3880 DPE- GPS LINK

Description

The HARDI PILOT 3880 DPE with GPS is a conventional HARDI PILOT 3880 DPE with an added feature of being able to receive a volume rate from an external data source as for example a tractor DGPS terminal. The main components are:

- An upgraded version of the HP 3880 display
- A RS232 cable with T-insert (only Fieldstar)

The HP 3880 display is linked with the DGPS tractor terminal using the enclosed cables.

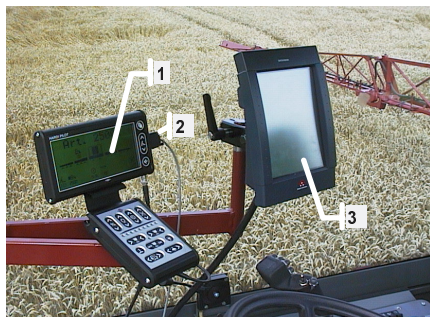
The HP 3880 GPS version of the display contains a menu in “Set up” in which the HP 3880 can be set to receive an external volume rate or to be used as a conventional HP 3880.

HP 3880 display linked to external DGPS tractor terminal

1. HP3880 display
2. RS232 cable
3. External DGPS tractor terminal



CLAAS AGROCOM terminal (ACT)



MASSEY FERGUSON FIELDSTAR or
DRONNINGBORG AGRIVISION terminal

HARDI PILOT 3880 DPE- GPS LINK

To initiate the GPS menu

Press [PAGE] and [↵] at the same time until the screen reads "GPS". Toggle with [ARROW] keys to "ON". Restart the HARDI PILOT.

External setting of application rate for variable rate application

Connect the HP 3880 - GPS display with the DGPS terminal. Use the enclosed 9-pin RS232 cable. The cable is connected on the side of the HP 3880 display. The other end is connected to the DGPS terminal following the instructions specific to the terminal. The MASSEY FERGUSON FIELDSTAR/ DRONNINGBORG AGRIVISION cable has a 37-pin connector specific to that system. This connection cable is used together with T-insert cable and should be inserted on the FIELDSTAR/ AGRIVISION cab-connection. The RS232 output on the CLAAS ACT is placed on the back left side of the CLAAS ACT docking station.

Select [EXTERNAL] in the [SET UP] menu on the HP 3880. Choose [ON]. Press [↵] [↵] [↵].

The HP 3880 will now read a volume rate transmitted from the tractor terminal.

The FIELDSTAR/AGRIVISION terminal must be programmed as a tractor terminal and must be set to transmit serial communication (RS232) "TYPE2" from the tractor settings menu.

Please contact your supplier for details on your precision farming terminal.

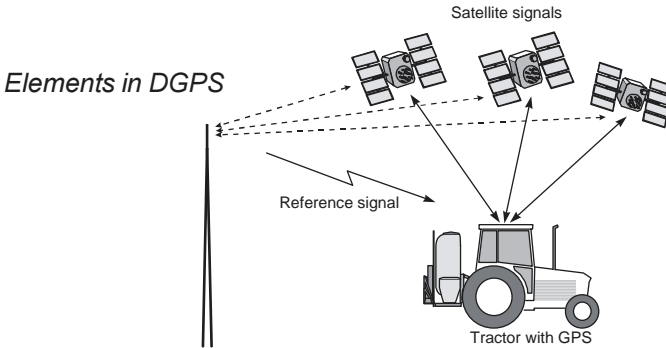
Setting up as a conventional HP 3880 (internal volume setting)

Select [EXTERNAL] in the [SET UP] menu on the HP 3880. Choose [OFF]. Press [↵] [↵] [↵].

The HP 3880 will now be set as a conventional HP 3880. The volume rate can be set manually via the display.

GPS and the function of HARDI PILOT – GPS LINK

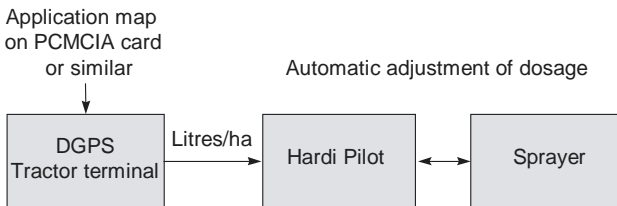
DGPS is an abbreviation for “Differential Global Positioning System”. It is a satellite-based system used to position precisely by means of signals from satellites combined with a reference signal from ground based transmitters. The DGPS system has a level of precision within 1-2 metres.



The HARDI GPS is based on the HARDI PILOT spray controller linked to a GPS receiver and precision farming terminal. The HARDI PILOT is a well proved controller, which is able to automatically adjust the volume applied with the sprayer.

With the HARDI PILOT linked to the terminal, the sprayer will automatically adjust the volume rate according to the specific position of the sprayer and an application map made in advance.

Elements in the HARDI PILOT GPS configuration when connected with a DGPS and tractor terminal:



The HARDI GPS system is compatible with the most common GPS receivers used on combine harvesters and tractors.

HARDI PILOT 3880 DPE- GPS LINK

Adjusting by change of pressure

In the present HARDI PILOT - GPS LINK system, the variable dosage is obtained through a change in the pressure. To counteract for the risk of getting an unsatisfactory application technique, the method is limited to apply dosages in the interval plus or minus 25 percent on each side of a mean value. This interval might be expanded up to plus or minus 40-50 percent with air assistance (HARDI TWIN SYSTEM) since the air stream will facilitate deposition and reduce drift.

The dosage interval can be increased from +/-30 percent to +/- 50 percent with the use of air assistance. Combinations of pressures and speeds with and without Hardi Twin air assistance

Nozzle	Volume Litres/ha	Pressure bar	\$
+/- 30 percent without Twin 4110-14	125	2	
+/- 50 percent with Twin 4110-14	100	1.5	
	300	5.5	

Chart HF

Be aware of drift!



Be careful when spraying and adjusting the pressure at the same time. High pressures will result in the formation of smaller droplets more susceptible to drift. If a volume range is chosen that will result in pressures at or higher than 5 bar, make sure wind speed is low at the application time. Alternatively, driving speed can be decreased in order to reduce pressure at the nozzles or the nozzles can be changed to some with a larger size orifice.

Site specific use pesticides

Methodologies for site-specific application of pesticides have been investigated in detail in a number of countries. Both in terms of developing simple methods to define subdivisions of fields with different treatment need and in terms of developing models to calculate application maps.

Although the technique is still in its infancy, it has been shown that the use of herbicides can be reduced when site specific application is compared with conventional application..

The main decision factors in herbicide applications are related to the occurrence of weeds determined in numbers and species and canopy densities related to the competitiveness of the crop against the weeds.

Results from a trial comparing site specific application of herbicides in winter wheat. Denmark 1996 (Danish Institute of Agricultural Sciences).

	Minimum	Herbicide units Maximum	Aver
Untreated	-	-	0
Conventional	-	-	0.9
Site specific application	0.25	1.00	0.3

Field trials with site-specific fungicide application have been sparser. Results from a Danish trial in 1996 indicate a positive yield increase achieved with the same total use of chemicals.

Results from a trial comparing site specific application of fungicides in winter wheat. Denmark 1996. The trial was treated twice, mainly against powdery mildew (Danish Institute of Agricultural Sciences).

HARDI PILOT 3880 DPE- GPS LINK

	Minimum	Fungicide units Maximum	Aver
Conventional	-	-	0.8
Site specific application	0.67	1.02	0.8

The main decision factors in fungicide applications are related to the disease level in the crop and canopy densities. The within field variation is great on both factors.

Since a detailed monitoring has no practical potential, it is expected that application maps can be calculated from other factors such as yield maps, density maps, topography and surrounding vegetation, combined with the detailed knowledge of the manager.

Please refer to your crop husbandry adviser for further advise.

How to make application maps

The application map is made on a PC before spraying. It is necessary to use software compatible with the tractor terminal in use. Normally this software will be delivered together with the terminal For example the AGROCOM AGRO-MAP package with the CLAAS ACT or the APPLICATION MAPPING SYSTEM with the MF FIELDSTAR/DRONNINGBORG AGRIVISION terminal. Other locally produced software can be compatible with the terminal.

Field borderline

In most programmes, it is easy to paint the dosages on a field map. If a field map is not available from previous years yield maps; it will be necessary to measure the field borderline. Driving along the field borders can do it, while the terminal is in a special record mode.

HARDI PILOT 3880 DPE- GPS LINK

In the same record mode, some terminals can be used to position areas in the field with specific characteristics important for later creations of application maps. This could be areas with high densities of certain weed species, hills, pot-holes, specific soil types or similar.

When the application map is finished, it is normally downloaded on a small data card and all the information can be transferred from the PC to the terminal in the tractor or sprayer.

Herbicide maps

The most important factors for herbicide application maps is:

- Weed species
- Patches of weeds
- Canopy density.

The species and their location have great importance related to the choice of herbicide active ingredient. Make sure that the active ingredient in the chosen herbicide has a good efficacy against the most damaging weeds in the field.

Patches are important in order to determine areas with high need of control. Application rates should be kept high in those areas. Application rates can be reduced in areas with low amounts of weeds.

The canopy density is important as a measure of the crop competition against the weeds. In most cases, the density maps are not available. In such cases densities might be estimated from previous years yield maps, since high yielding areas usually also will have high canopy densities. Application rates can be reduced in the dense areas of the field.

HARDI PILOT 3880 DPE- GPS LINK

Step 1:

Deciding the average application rate: This could be the rate used if the field was applied with a conventional methodology. Alternatively, the application rate could be reduced by 5-15 % because of the expected better targeting of the treatment due to site specific application.

Step 2:

The average dosage is adjusted guided by the canopy density. If density maps are not available, use previous years' yield maps. The yield can be used as an estimate of this year's canopy density. The adjustment can be done automatically in most programs. If not automated, the adjustments can be drawn on the map. Adjustments are allowed up to 30 % without affecting the application technique inappropriate. Apply the low application rates in the dense areas of the field and the highest in the open areas.

Step 3:

Finally, the map is corrected in the areas where the manager has experience of either high or low treatment need. For example areas with high or areas with little occurrence of weeds. Adjustments are allowed up to 30 % on each side of the mean value without affecting the application technique inappropriate. Apply the higher application rates where the trouble weed populations are most dense.

Fungicide maps

The most important factors for fungicide application maps is:

- Disease level
- Patterns of disease occurrence
- Canopy density.

HARDI PILOT 3880 DPE- GPS LINK

The disease level and the disease patterns have great importance, since high application rates should be directed towards areas with the highest disease pressure. In many cases will the manager have some understanding of areas with high or low disease pressure.

The density of the canopy is important since it has an impact on the resulting concentration of active ingredients on the leaves. High densities will result in unwanted lowering of the concentration. To achieve a more constant level on the leaves, adjust application rates up in the dense parts of the field and down in the open parts.

In most cases, the density maps are not available. Then densities might be estimated from previous years yield maps, since high yielding areas usually also will have high canopy densities.

Step 1:

Deciding the average application rate: This could be the rate used if the field was treated with a conventional methodology. Alternatively, the application rate could be reduced by 5-15 % because of the expected better targeting of the treatment due to site specific application.

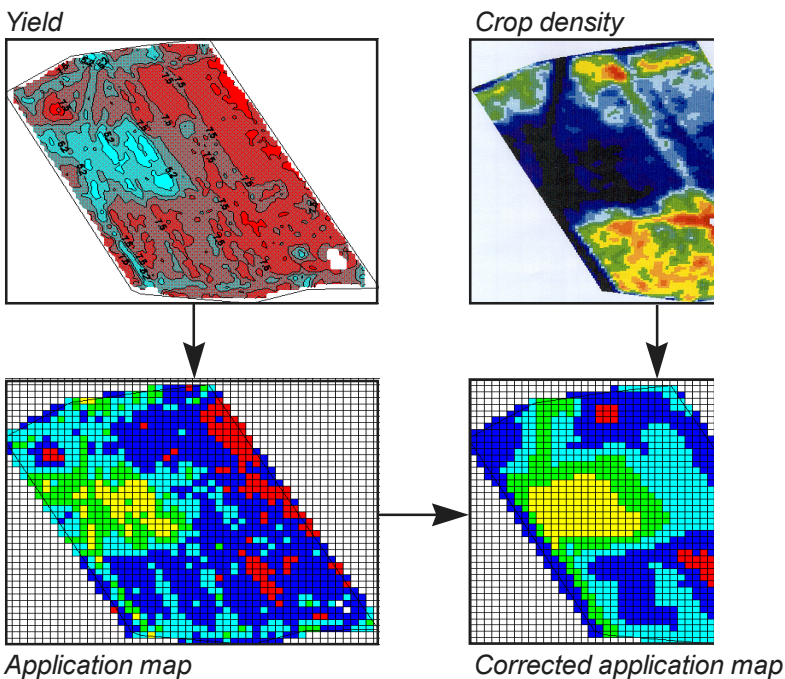
Step 2:

The average dosage is adjusted guided by the canopy density. If density maps are not available, use previous years' yield maps. The yield can be used as an estimate of this year's canopy density. The adjustment can be done automatically in most programs. If not automated, the adjustments can be drawn on the map. Adjustments are allowed up to 30 % without affecting the application technique inappropriate. Apply the high application rates in the dense areas of the field and the lowest in the open areas.

HARDI PILOT 3880 DPE- GPS LINK

Step 3:

Finally, the map is corrected in the areas where the manager has experience of either high or low treatment need. For example areas with high or areas with low disease pressure. Adjustments are allowed up to 30 % on each side of the mean value without affecting the application technique inappropriate. Apply the higher application rates where disease risk is experienced to be high.



Fungicide application map made on the basis of yield and crop density. Germany.

Mixing the chemical concentration in the sprayer tank



Be aware that the variation in application rate is obtained through a variation of the total spray volume applied. E.g. a 25 % variation obtained through a variable volume rate from 150 to 250 litres pr ha.

The spray solution is therefor depending on the average application rate decided. Use the average volume rate to determine the spray volume concentration

This would be a spray mix equivalent to an average of 200 litres pr ha in the case where the variation is aimed at 25 % obtained through a variable volume rate from 150 to 250 litres pr ha.

Please refer to your crop husbandry adviser for further advise.

HARDI PILOT 3880 DPE- GPS LINK

Notes: