

Instruction DIGIPLAN 300/301

Contents

1. Description of instrument

- 1.1. Components
- 1.2. Pushbuttons
- 1.3. Display

2. General Description

- 2.1. Introduction
- 2.2. Accuracy of measuring
area, volume, length
- 2.3. Guarantee

3. Measurement of areas

- 3.1. General description and
preparations before measuring
- 3.2. Normal measurement

4. Measurement of length

- 4.1. General description
- 4.2. Measurement

5. Measurement of volumes

- 5.1. General description
- 5.2. Programming and measuring

6. Average value

7. Memory of measurement

8. Scale selection

9. Programmable scales

- 9.1. Programming 1 : n
- 9.2. Programming n : 1

10 Different scales x / y

- 10.1. General description
- 10.2. Measurement

11. Unit selection

12. Selection: Metric or Imperial

13. Calibration

- 13.1. Area
- 13.2. Length

14. Power supply

- 14.1. Battery monitoring
- 14.2. Battery and charger
- 14.3. Care of battery

15. Data output

16. Incorrect operation

1. Description of instrument

1.1.Components

- 1) Housing
- 2) Tracing arm
- 3) Tracing lens
- 4) Pole plate
- 5a) Pole arm (long tracing arm)
- 5b) Pole arm (short tracing arm)
- 6) Socket for charger lead and data output
- 7) Measuring wheel
- 8) Test area
- 9) Roller
- 10) Length measuring index
- 11) Line to be measured

1.2.Pushbuttons

ON/OFF	1. Press short - power supply on 2.press long - power supply off
START	Standby for measurement (before each measurement) display: 0.000
MENUE	Select of functions (keep pressing until the required function appears) a) AREA (measuring areas) b) LINE (measuring length) c) VOL (measuring volumes) d) VOL height (thickness of sections for measuring volumes) e) x (x-scale of different scales x and y) f) y (y-scale of different scales x and y) g) Area xy (measuring areas in different scales x and y)
HOLD M+	1. The measured value is stored in the memory positively 2. In following functions the value will be changed positively a) programmable scales and b) „height“ of measuring volumes
HOLD M-	1. The measured value is stored in the memory negatively 2. In following functions the value will be changed negatively a) programmable scales and b) „height“ of measuring volumes
MR/MC	Press once = memory recall Press twice = memory clear
AV/POINT	1. After START and measurement, the average of up to 19 measurements are calculated. Nos. of measurements will be shown in small figures. 2. Position the decimal point
UNIT	1. Two units for each scale can be selected 2. Long press = selection of metric or imperial system
SCALE	Fixed and programmable scales are recalled in sequence and may be changed with HOLD M+ and HOLD M-
SET/CAL	a) Programmable scales are stored in the memory b) Select of function of calibration and storage of calibration value
•	„Tone“ on pressing a button

1.3.Display

00000000	8 digits for measurement value and scales
⁰⁰	Small two figure digit shows a) the nos. of storage for scales b) the nos. of readings for average value (max. 19) c) the nos. of part volume
1 : 1	Scale
mm, cm, m, km, ha, liter	Units metric system
inch, feet, acres, miles	Units imperial system
BAT	Battery low – needs recharging
CAL J	Calibration long tracer arm necessary
CAL J	Calibration short tracer arm necessary
CAL	Calibration length measurement necessary
M	Memory in use
-	Value in memory is negative
AREA	Measuring area in use
LINE	Measuring length in use
VOL	Measuring volume in use
AREA xy	Measuring area with different scales x/y in use
x, y	x- or y-scale in use
SCALE	In the menufunction AREA, LINE and VOL the scale may be recalled in sequence and changed with HOLD M+ and HOLD M-
VOL height	Thickness of sections for measuring volumes is shown or may be changed with HOLD M+ and HOLD M-

2. General Description

2.1. Introduction

The HAFF Electronic Digital-Planimeter DIGIPLAN has been manufactured with great care using the latest technology and to the very highest standards.

Although it is easy to operate please take the trouble to read these instructions carefully. They explain the various measuring facilities and studying them will ensure that you get the best service from the instrument.

2.2. Accuracy

The DIGIPLAN is a highly sensitive instrument and must be handled carefully.

Because the measuring wheel is designed to move extremely easily it is mounted in very special bearings which must not be subject to compression or shock.

2.2.1. For measuring areas and volumes the DIGIPLAN gives the choice of 2 accuracies.

1. with a long tracer arm
(the pole arm (5a) must be inserted in the „outer“ pole hole)
resolution 0,1 cm² using scale 1:1
accuracy $\pm 0,2 \%$ on an area of 100 cm²
2. with a short tracer arm
(the pole arm (5b) must be inserted in the „inner“ pole hole)
resolution 0,05 cm² using scale 1:1
accuracy $\pm 0,1 \%$ on an area of 100 cm²

2.2.2. For measuring length

- resolution 0,1 mm using scale 1:1
accuracy $\pm 0,1 \%$ over a length of 100 mm

2.3. Guarantee

The instrument is guaranteed for 12 months from the date of purchase. The guarantee is invalid if the DIGIPLAN has been opened by an unauthorized person or if it has not been handled in accordance with these instructions.

3. Measurement of areas

3.1. General description

Preparations before measuring:

Check the state of battery – BAT might not be displayed. The working table should be horizontal and the working surface on which the measuring wheel is to run should be clean and unbroken.

The pole arm (5) – or the roller (9) and the tracing arm (2) should be approximately at right angles when the tracing lens (3) is in the centre of the area to be measured. Mark the start/finish point on the boundary. Position the center of the tracing lens (3) accurately over the starting point.

Using the tracing lens (3), trace the boundary of the area until you reach the start again so that the small ring in the center deviates as little as possible from the line. The measurement will always be positive whether you trace round in clockwise or anticlockwise direction.

3.2. Normal measurement

Activity	Button	Display	Remarks
Switch on	ON e.g.	cm LINE 2 1 : 5	
	if	CAL	Planimeter is to calibrate (see no. 13)
Select menue AREA	MENUE	cm AREA 2 1 : 5	Scale 1 : 5 is active
DIGIPLAN in measuring position	START	cm AREA 0.000	
Measurement	e.g.	cm AREA 221.472	
Next area	START	cm AREA 0.000	
Measurement	e.g.	cm AREA 766.846	

4. Measurement of Length

4.1. General description

With the DIGIPLAN 300/301 it is possible to measure the length not only of straight lines but also of curves. All features of the measurement of areas are applicable, only the function LINE has to be selected by pressing the „MENUE“ button. The calibration is different in going along a distance of exactly 200 mm. (See 13.2)

Preparations before measuring

(Pole arm and Roller are not necessary)!!!

Position the center (needle in the cross of double and single line) of the length measuring-index accurately over the starting point, that the measuring line is in the middle and longitudinal to the double line.

After „START“ trace along the line and take care that you turn the DIGIPLAN that the line is always between and longitudinal to the double line of the index. Around corners of lines it is easier and more exact if you press the needle of the index exactly on the corner and then turn the DIGIPLAN around the needle until the double line is again between and longitudinal to the following line.

In the end of the measurement the cross must be exactly over the finish.

4.2. Measurement

Activity	Button	Display	Remarks
Switch on	ON e.g.	cm AREA 1 1 : 1	last scale used
Select of menu LINE	MENUE	cm LINE 1 1 : 1	
DIGIPLAN in measuring position	START	cm LINE 0.000	
Measurement	e.g..	cm LINE 11.330	

5. Measurements of Volumes (only in the metric system)

5.1. General description

The DIGIPLAN 300/301 enables to measure and calculate the volume e.g. of a water reservoir. A map showing contour lines for the area of the reservoir is required. After the input of the height and the tracing of the single contours of each section, the included volume will be calculated.

Activities:

1. Setting the height (distance of each contour)
2. Setting the required scale
3. Measurement of the areas of each contour (beginning with the smallest or largest but not mixed)
4. Readout

5.2. Programming and measuring (Volume)

e.g.: scale 1 : 500 m², 3 sections, height 5 m

Programming of the height 5 m

Activity	Button	Display	Remarks
Switch on	ON e.g.	mm AREA 1 1 : 1	last scale used
Select of menu VOL height	MENUE e.g.	mm VOL 1 height	
Select of unit „m“	UNIT	m VOL 1 height	
Change of the value from 1 to 5	HOLD M+	m VOL 5 height	
Keep pressing „HOLD M+“ button until the required value appears „HOLD M-“ will change the value negatively			

Programming of scale 1:500 (Volume)

Activity	Button	Display	Remarks
Select of menu VOL	MENUE	mm VOL 1 1 : 1	last scale used
Select of menu SCALE	SCALE	mm VOL 1 1 : 1 SCALE	
Select of scale 1:500 (keep pressing until required scale appears)	SCALE	m VOL 7 1 : 500 SCALE	
Leave menu SCALE	ON or MENUE	m VOL 7 1 : 500	
Now the programming for VOLUME measurement is ready. Measurements of the single sections follow.			
DIGIPLAN in measuring position	START	m VOL 0.000	
Measurement of 1. section		m VOL 69,750	
Storage of 1. value	HOLD M+	M VOL 0.000	
2. section	START	M m VOL 0.000	
Measurement		M m VOL 172,980	
Storage 2. value	HOLD M+	M m VOL 1 606,825	1. part volume of section 1 and 2
3. section	START	M m VOL 0.000	
Measurement		M m VOL 1 337,590	
Storage 3. value	HOLD M+	M m VOL 2 1276,425	2. part volume of section 2 and 3
4. section	START	M m VOL 0.000	
measurement		M m VOL 650,070	
Storage 4. value	HOLD M+	M m VOL 3 2469,150	3. part volume of section 3 and 4
Recall memory total	MR/MC	M m VOL 4352,400	total volume
Clear memory	MR/MC	m VOL 7 1 : 500	

6. Average value AV/POINT

To reduce human error, the average of up to 19 readings can be found. The number of readings is shown in small figures left at the display.

Activity	Button	Display	Remarks
1. measurement	START	mm AREA 0.000	
measurement		mm AREA 47,367	
Transfer of value	AV/POINT	mm AREA ₁ 47,367	
2. measurement	START	mm AREA 0.000	
measurement		mm AREA 50,378	
Average value of two	AV/POINT	mm AREA ₂ 48,872	
3. measurement	START	mm AREA 0.000	
measurement		mm AREA 49,878	
Average value of three	AV/POINT	mm AREA ₃ 49,207	
Transfer to memory	HOLD M+	M mm AREA ₂ 49,207	as described in section 7

7. Memory of measurement HOLD M+ / HOLD M- / MR/MC

Several areas can be added and subtracted. A large area which would exceed the measuring range can be subdivided and the total area found by putting parts into the memory.

Activity	Button	Display	Remarks
Switch on	ON e.g.	cm AREA 2 1 : 5	last scale used
1. area	START	cm AREA 0.000	
Measurement		cm AREA 234,500	= A ₁
Storage (positive)	HOLD M+	M cm AREA 234,500	
2. area	START	M cm AREA 0.000	
Measurement		M cm AREA 345,600	= A ₂
Storage (positive)	HOLD M+	M cm AREA 345,600	
3. area	START	M cm AREA 0.000	
Measurement		M cm AREA 432,100	= A ₃
Storage (negative)	HOLD M-	M cm AREA 432,100	
Recall memory total	MR/MC	M cm AREA 148,000	
$A_1 + A_2 - A_3 = 234,500 + 345,600 - 432,100 = 148,000 \text{ cm}^2$			
Clear memory	MR/MC	cm AREA 2 1 : 5	

8. Scale selection

The actual area is calculated electronically in the DIGIPLAN depending on the scale in use. There is a storage for 19 scales each in the metric and imperial system. 17 are scales permanently stored and 2 are programmable. The storage number of every scale is shown in small figures left at the display.

e.g. scale 1 : 10 cm²

Activity	Button	Display	Remarks
Switch on	ON e.g.	mm AREA 1 1 : 1	last scale used
Select menu SCALE	SCALE	mm AREA 1 1 : 1 SCALE	
Select of scale 1:10	SCALE	cm AREA 3 1 : 10 SCALE	keep pressing until required scale appears
Leave menu SCALE	MENUE or ON	cm AREA 3 1 : 10	

9. Programmable scales

Two free programmable scales can be stored in the storage number 18 and 19 which are shown in small figures left at the display. If a third scale will be programmed it will get the number 18. The former scale on 18 will change to 19. The former scale on 19 gets deleted.

Permanently stored scales and units

Metric:

Scales	Units for area and volume	Units for length
1:1 1:5	mm ² or cm ²	mm or cm
1:10 1:20 1:50	cm ² or m ²	cm or m
1:100 1:500 1:1000 1:2500 1:5000	m ² or ha	
1:10000 1:25000 1:50000 1:100000 1:500000	ha or km ²	m or km
1:1000000 1:5000000	km ²	km

Imperial:

Scales	Units for area and volume	Units for length
1:1 1:16 1:24 1:48 1:96 1:120	inch or feet	inch or feet
1:792 1:1200 1:1250 1:2400	feet or acres	feet or miles
1:3960 1:7920 1:63360 1:100000 1:500000	acres or miles	
1:1000000 1:5000000	miles	miles

Possible ranges of free programmable scales:

Metric:

Scale	Units for Area/Volume	Units for length
1000:1 till 1:9,999	mm ² or cm ²	mm or cm
1:10,000 till 1:99,999	cm ² or m ²	cm or m
1:100,00 till 1:9999,9	m ² or ha	
1:10000 till 1:999990	ha or km ²	m or km
1:1000000 till 1:9999900	km ²	km

Imperial:

Scale	Units for Area/Volume	Units for length
1000:1 till 1:120,00	inch or feet	inch or feet
1:120,01 till 1:2400,0	feet or acres	feet or miles
1:2400,1 till 1:999990	acres or miles	
1:1000000 till 1:9999900	miles	miles

9.1. Programming 1 : n

One of the 17 permanently stored scales is to select, which value without point is nearest to wanted scale.

The value will be changed by pressing the button „HOLD M+“ (increasing) and „HOLD M-“ (decreasing). One short touch the value changes in steps of one. Long pressing the steps will double continuously e.g. 1 – 2 – 4 – 8 – 16 – 32 – 64 etc.

After interruption the procedure starts again 1 – 2 – 4 ...

The position of the decimal point can be set for 3 places from the right by pressing the „AV/POINT“ button. Then choose the unit by pressing the „UNIT“ button.

e.g. scale 1 : 65,43 cm²

nearest scale without point 1 : 5000

Activity	Button	Display	Remarks
Switch on	ON e.g.	mm 1 : 1 AREA	
Select of SCALE	SCALE	mm 1 : 1 SCALE AREA	
Select scale which is nearest to the wanted one	SCALE	m 10 : 5000 SCALE AREA	
Change value positive	HOLD M+	m 10 : 7047 SCALE AREA	Value to high
Change value negative	HOLD M-	m 10 : 6543 SCALE AREA	Value o.k.
Position the decimal point (press twice)	AV/POINT	m 10 : 65,43 SCALE AREA	
Select of unit	UNIT	cm 10 : 65,43 SCALE AREA	
Fix value in storage no. 18	SET/CAL	cm 18 : 65,43 SCALE AREA	
Leave SCALE	MENUE	cm 18 : 65,43 SCALE AREA	

9.2. Programming n : 1

e.g. scale 50,8 : 1 cm²

Activity	Button	Display	Remarks
Swith on	ON e.g.	ha AREA 13 1 : 50000	
Select of SCALE	SCALE	ha AREA 13 1 : 50000	
Select scale 1:1	SCALE	mm AREA 1 1 : 1 SCALE	
Select scale n:1	HOLD M-	mm AREA 1 1 : 1 SCALE	Figure 1 jumps to the right side of the display
Change of value to 508	HOLD M+	mm AREA 1 508 : 1 SCALE	
Position the decimal point	AV/POINT	mm AREA 1 50,8 : 1 SCALE	
Select unit cm instead mm	UNIT	cm AREA 1 50,8 : 1 SCALE	
Fix value in storage no. 18	CAL/SET	cm AREA 18 50,8 : 1 SCALE	
Leave SCALE	MENUE or ON	cm AREA 18 50,8 : 1	

10.Different scales x/y (in the metric system only)

10.1. General Description

It is possible to measure areas with different scales in the x- and y-axis. The x/y-scales are without an unit.

The unit of the measured value is determined by the DIGIPLAN according to nos. of digits.

Choice of scales

If your wanted scale is not one of the stored scales you have to programm your scale (section 9) before you select menue x or y.

10.2. Measurement

Scale selection x and y
 e.g. scale x = 1 : 1
 scale y = 10 : 1

Activity	Button	Display	Remarks
Switch on	ON e.g.	mm AREA 2 1 : 5	last used scale
Select menue x	MENUE e.g.	2 1 : 5 x	
Select scale 1 : 1	SCALE	1 1 : 1 x SCALE	
Select menue y	MENUE e.g.	4 1 : 1 y	last used scale
Select scale 10 : 1	SCALE	18 10 : 1 y SCALE	programmed scale storage no.18
Select menue AREA xy	MENUE	AREA 0 xy	
DIGIPLAN in measuring position	START	mm AREA 0.000 xy	
measurement	e.g.	mm AREA 254,169 xy	

11.Unit selection UNIT

2 adjacent units can be selected at will by pressing the „UNIT“ button before the measurement or after „AV/POINT“ or „HOLD“ or „MR“. The measurement will automatically shift to the upper unit if the measurement overflows the display using the lower unit.

The possible units for each scale in the metric and imperial system see section 8 and 9.

For the measurement of volumes you have for the height the choice between mm or m. The result will be in mm³, cm³, liter or m³. In the imperial system the measurement of volume and in different x/y-scales is not possible.

12.Selection of system of units: Metric or Imperial

Select the menue functions „AREA“, „LINE“, „VOL“.

A long press of the „UNIT“ button changes between the metric- and imperial system.

13.Calibration

The DIGIPLAN is mechanical adjusted and electronically calibrated.

The user can calibrate the DIGIPLAN to match the working surface in use by means of the test area (8) supplied. The appropriate factor obtained by using the test area (ellipses) is calculated and stored when the „CAL“ button is pressed.

For the calibration of the length a distance of exactly 200 mm has to be traced.

13.1. Calibration AREA (Volumes)

The DIGIPLAN has to be calibrated for the long- and short tracer arm.

Long tracer arm: trace the area (ellipse) of 100 cm² 1x, 2x or 3x

Short tracer arm: trace the area (ellipse) of 50 cm² 2x, 4x or 6x

For greater accuracy trace the test area with the highest possibility.

After the power supply was interrupted the DIGIPLAN has to be calibrated. The display shows:

CAL J Calibration for long tracer arm

CAL J Calibration for short tracer arm

Activity	Button	Display	Remarks
Switch on	ON	mm VOL 1 1 : 1	etc.
Select menu AREA	MENUE e.g.	mm AREA 1 1 : 1	
Switch to calibrate mode	CAL/SET	CAL J AREA 2732	last calibration value
DIGIPLAN in measuring position on test area	START	CAL J AREA 0	
Trace round the test area of 100 cm ² 1x, 2x, 3x	e.g.	CAL J AREA 2764	new calibration value
Store the value	CAL/SET	mm AREA 1 1 : 1	

The calibration for the short tracer arm is accordingly. The display shows CAL J

If outside following ranges the message in the display is err = error

Long tracer arm test area 100 cm ²	1 rounds	800 – 900
	2 rounds	1600 – 1960
	3 rounds	2400 - 2940
Short tracer arm test area 50 cm ²	2 rounds	1800 – 2160
	4 rounds	3600 – 4320
	6 rounds	5460 - 6480

The calibration ensures that all subsequent measurements made on this document, at any scale, can be made accurately.

13.2. Calibration Length - CAL

In going along a distance of exactly 200 mm the DIGIPLAN is calibrated for length measuring.

Activity	Button	Display	Remarks
Switch on	ON/OFF e.g.	mm AREA 1 1 : 1	etc.
Select menue LINE	MENUE	CAL or 1 : 1 LINE	etc.
Switch to calibrate mode	CAL/SET	CAL 3120 LINE	last calibration value
DIGIPLAN in measuring position	START	0 LINE	
Trace along a test line of 200 mm		CAL 3133 LINE	new calibration factor
Store the value	CAL/SET	mm 1 1 : 1 LINE	

14.Power supply

14.1.Battery monitoring

The symbol „BAT“ indicates that the battery soon need recharging. The measurement may not be correct.

14.2.Battery charger

Charging:

- 1) Switch off the DIGIPLAN
- 2) Plug the charging lead into the socket (6) at the right side of the housing
- 3) Connect the charger to a 230V AC power supply
- 4) Charge a completely flat battery for about 15 hours and pro-rata for partially discharged ones. Do not overcharge as this will shorten the life of the battery.
- 5) Disconnect the charger from the mains.
- 6) Disconnect the lead from the DIGIPLAN

Do not work with the charger connected.

14.3.Care of Battery

The power supply is switched off after 1 minute if the measuring wheel is not moved and the display shows the last used menue.

You can restart by pressing the „START“ button if no buttons are pressed, the display will switch off after 5 minutes.

Any measurements which have not been stored in the memory will then be lost. The other values such as calibration factor, variable scales and memory content are retained.

15.Data output

The accessory the serial interface no. 304 is necessary, which has to be connected with the socket (6).

After pressing the „HOLD M+“, „HOLD M-“ and „MR“ button the data will be transmitted to a computer with interface V24 (RS232).

16.Incorrect operation

If you make a mistake when tracing, start again by pressing „START“.

If you press a wrong button, start by pressing „ON“.