



CROP SPRAYING POCKET GUIDE 2016

HYPRO[®] NOZZLES

Spray nozzles have been manufactured at Pentair's Cambridge, UK site for 60 years, initially under the Lurmark name and now the Hypro® brand.

Pentair is also the leading international producer of agricultural pumps sold under Hypro®, Shurflo® and Berkeley® brand names.

Hypro® spray nozzles, sprayer pumps and components are fitted by the world's premier manufacturers of spray equipment.

Pentair is an \$7.5 billion company with more than 100 manufacturing sites and 30,000 employees worldwide. Pentair offer a full range of flow management, filtration, thermal management and equipment protection solutions to a wide range of industries.



This booklet is designed as a quick reference guide to help you select nozzles that will achieve efficient and safe spray applications whatever the challenge. For more information and advice please contact us:



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Working with Hypro Nozzles

SPRAY CLASSIFICATION

For conventional hydraulic nozzles, spray quality varies according to nozzle size (defined by nozzle flow in l/min and colour) and with pressure.

Spray quality is usefully defined by the Volume Median Diameter (VMD) which is the droplet size where half of the volume of spray is in larger and half is in smaller droplets.

The BCPC International Spray Classification System groups spray quality into five categories: VERY FINE, FINE, MEDIUM, COARSE AND VERY COARSE, each category covers a range of VMDs.

Spray manufacturers usually indicate the optimum BCPC spray quality on product labels using the principles shown in the table (right).

Where there is a BCPC spray quality classifications for Hypro nozzles, it is indicated in the nozzles tables on pages 14-28.

Smaller droplets result in improved spray coverage especially of smaller targets and can move laterally through the upper layers of a crop

FINE - VMD 150-200 μm

Produce more droplets per unit area to enhance spray retention on the target. Suitable for contact acting fungicides and insecticides. There is a higher risk of spray drift with fine sprays.

MEDIUM - VMD 200-300 μm

A mixed droplet spectrum ideal for most targets. The default option if no other spray quality is indicated.

COARSE - VMD 300-400 μm

Use with residual / soil applied herbicides where drift reduction is the priority, for example near to water.

canopy. However they are less likely to penetrate down into a thicker crop. They also tend to drift more, resulting in spray landing where it is not intended.

Larger droplets are produced by bigger nozzle sizes, lower pressures and narrower spray angles. Whilst a larger droplet size will reduce spray drift, halving the VMD results in 8 times

DRIFT CLASSIFICATION OF HYPRO AIR INDUCTION NOZZLES

Hypro Air-Induction Nozzle Type	Drift Reduction*	015	02	025
Guardian AIR	> 75% (LERAP 3 Star)	1.0 - 1.25 bar	1.0 - 1.25 bar	1.0 - 1.5 bar
Guardian AIR Twin	50%-75% (LERAP 2 STAR)	-	2.0 - 2.25 bar	2.0 - 2.25 bar
Ultra Low Drift	> 90% (JKI classified nozzle)	-	-	-

* Drift reduction is indicated as a percentage compared to FF110° blue 03 at 3 bar. In the UK, following a LERAP assessment, certain spray nozzles are approved for spraying close to water courses because of their drift reducing capability.

fewer droplets, so spray coverage is compromised. Large droplets are also more likely to bounce off plant leaves.

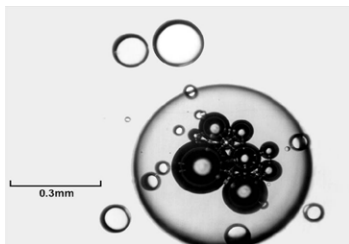
In addition to choosing larger droplets, spray drift can be reduced by reducing turbulence, for example by lowering boom heights and slowing down spraying speeds.

AIR INDUCTION (AI) NOZZLES

Air Induction nozzles incorporate air inlet holes in their design which mixes air and fluid to make larger air-filled droplets (as shown right). These droplets have larger VMDs, a more uniform droplet size and fewer driftable fine droplets. Because they contain air as well as fluid they do not perform in the same way as a coarse fluid-only droplet and BCPC spray quality is not defined for them.

Droplet size comparisons for AI nozzles are however published in the current UK HGCA Nozzle Selection Guide which can be found at: <http://bit.ly/15WRbgU>.

AI nozzles at the finer end of the spectrum can



be successfully used in place of conventional 'medium' spray quality on many targets, with the advantage of reduced spray drift. By inclining the spray forward or backward some lateral movement can also be achieved.






For comparison of air induction and conventional nozzle recommendations for different targets see pages 12 and 13 of this guide.

Around Europe various authorities including the UK's CRD (LERAP) and Germany's JKI classify and approve spray nozzles for their drift reduction compared to conventional nozzles, some of these are shown below.

03	035	04	05	06	08
1.0 - 1.5 bar	1.0 - 1.5 bar	1.0 - 1.5 bar	1.0 - 1.5 bar	-	-
2.0 - 3.0 bar	2.0 - 2.5 bar	2.0 - 3.0 bar (25-50% reduction)	2.0 - 3.0 bar	2.0 - 3.0 bar	2.0 - 3.0 bar
2.5 - 3.0 bar (50% reduction)	-	2.5 - 3.0 bar	2.5 - 8.0 bar	-	-

IDENTIFYING WIND SPEED

The BCPC advises that wind speeds of 3.2 to 6.5 km/h (2 - 4 mph) are ideal for spraying. The table below explains how to judge windspeed. If conditions deteriorate and spraying has to stop, any spray that is left in the tank must be agitated and ideally regularly recirculated to prevent settling and blockages once spraying resumes.

Approximate air speed at boom height*	Beaufort scale	Description	Visible signs	Spraying	
Less than 2 km/h (Less than 1.2 mph)	Force 0	Calm		Smoke rises vertically	Only use medium or coarse spray quality
2 - 3.2 km/h (1.2 - 2 mph)	Force 1	Light air		Direction shown by smoke drift	Acceptable spraying conditions
3.2 - 6.5 km/h (2 - 4 mph)	Force 2	Light Breeze		Leaves rustle, wind felt on face	Ideal spraying conditions
6.5 - 9.6 km/h (4 - 6 mph)	Force 3	Gentle Breeze		Leaves and twigs in constant motion	Increased risk of spray drift. Take special care
9.6 - 14.5 km/h (6 - 9 mph)	Force 4	Moderate		Small branches moved, raises dust or loose paper	Spraying inadvisable

* Wind speed at typical boom heights is lower than Beaufort speeds which are measured at 10 metres.

FORWARD SPEED

Usual spraying speeds are limited to around 16km/h, higher speeds increase work rate but they also increase turbulence that may result in unacceptable spray drift and boom bounce that can affect the evenness of spray across the boom.

The nozzle output needed to apply the required rate (l/ha) will depend on the planned forward speed. Always add up the output of individual nozzles to ensure there is enough capacity in the pump for the desired speed and output

Once speed has been chosen, select the nozzle size that delivers the required spray volume and spray quality using the tables on pages 14 - 28.

With automatic rate controllers, a change in speed results in a change in pressure which consequently affects spray quality, so it is important to stick to the forward speed as much as possible once a nozzle has been chosen.



To calculate speed in km/h; divide 360 by the number of seconds it takes to travel 100 metres.

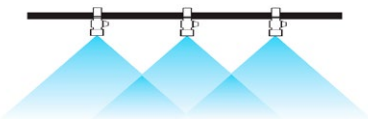
SELECTING SPRAY VOLUME RATE

Acceptable water rates can be found on the agrochemical product label (in litres of water per hectare) with recommended upper and lower limits.

Select a rate based on the spray coverage that is required, considering the target and the chemical mode of action; e.g. covering a dense canopy with a contact acting spray will require the higher end of the volume range. If in doubt use higher water volumes. Also consider the limits of the sprayer pump capacity and make sure you allow plenty of spare capacity for agitation.

SPRAY PATTERNATION

Hypo flat fan nozzles are designed to be used on a spray boom such that each adjoining pattern overlaps to give even spray distribution along the boom.



Evenness of patternation can be checked by adjusting the boom height such that water sprayed onto an area of dry concrete dries evenly.

The boom height in the field should be set so that the pattern overlaps on the target (e.g. ground, weed or crop). Always ensure that the boom does not go below the minimum single pattern overlap height, allowing for boom bounce.

Boom heights for different nozzle angles	110° Spray Angle at 50 cm nozzle spacing	80° Spray Angle at 50 cm nozzle spacing
Single Pattern Overlap (minimum)	35 cm	60 cm
Double Pattern Overlap	70 cm	120 cm
Recommended Boom Height	50 cm	75 cm

Always choose the lowest boom height to minimise spray drift.



Sprayer Calibration

Sprayers should be re-calibrated every 100 hectares (250 acres) of spraying. Check and clean all filters and ensure the pump feed and delivery lines are free of restrictions prior to calibration. To calibrate a sprayer, always use clean water only:

1. Using a calibrated measuring cylinder, measure the output from a minimum of four nozzles (at least one from each boom section) and compare it to the flow rates shown in the nozzle tables on pages 14-28.
2. If the output of these nozzles differs slightly from required, adjust the pressure until the correct rate is achieved at each nozzle. Ensure that a pressure change does not change the desired spray quality.
3. If the output of these nozzles differ by a large amount which cannot be compensated by pressure all nozzles should be replaced and the sprayer re-calibrated.
4. Any individual nozzle varying by more than 10% should be replaced - as should any nozzles showing broken or uneven spray patterns.



The nozzle calibration charts are intended only as an approximate guide to performance. Variation can occur, particularly with liquids of varying viscosity and specific gravity.

Pentair offers equipment that allows you to check the pressure and spray output at the nozzle, for more details see page 38.

FILLING THE TANK

Agitation reduces as the tank fills up with water. Always fill the tank by one third before adding chemical to avoid excessive agitation and foaming but avoid adding chemical to a full tank when agitation is at its lowest.



CONTAINER CLEANING

Always rinse containers out as they are emptied. This means that chemical residues end up in the tank for spraying and contaminated containers are not left around whilst you are in the field. Selecting the right cleaning nozzle will ensure that containers are 100% clean, as well as saving time and water. Pentair offer a selection of highly effective container cleaning nozzles (see page 33).

CLEANING

Blocked nozzles should be cleared by soaking in water and cleaning with a soft brush and air line. NEVER blow through the nozzle orifice by mouth. Do not poke with wire or pins, as this will cause damage to the nozzles. At the end of spraying, nozzles should be removed, soaked, cleaned and refitted especially where a different chemical is going to be sprayed next time.

WEAR AND TEAR

Nozzles wear out in the course of normal use. This wear cannot be seen visually so nozzles should be regularly calibrated. Keep one unused nozzle aside from each new set as a comparison. The whole set should be renewed when output has increased by 10% or more.

Most Hypro nozzles are made out of polyacetal, an engineering polymer that meets the chemical and wear tolerance of agrochemical spraying at a reasonable cost. Typically polyacetal nozzles should be replaced every 1 or 2 seasons of use.

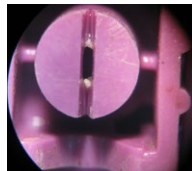
WHY DOES NOZZLE CONDITION MATTER?

Faulty or worn nozzles are one of the main

reasons that sprayers fail their tests under the UK National Sprayer Testing Scheme. In 2010-11 more than 15% of the 15,877 sprayers tested failed their tests for this reason. Under the new ISO 16122-2:2015 sprayer test protocol all nozzles must be tested, meaning that maintaining nozzle condition will be even more important.

Worn nozzles or damaged nozzles will affect the flow rate and spray quality as well as evenness of application across the boom.

This compromises chemical performance or, where there is no flow regulator on the sprayer, risks over-application. For example a worn set of nozzles applying 10% more chemical than intended to a winter wheat crop would cost on average around £13/ha in extra chemical - justifying the cost of replacing them with a new set of nozzles.



Popular Nozzle Types

Hypro produces a huge array of nozzles for every conceivable application, the following popular nozzle types cover the majority of agricultural application requirements:



Guardian AIR™ 110° Finer Air-induction Nozzles (see p14)

Good spray coverage, with reduced drift, ideal for lower water rates. Suitable for a wide variety of applications to cereals, oilseed rape and other combinable crops.



3 star at 1.25-1.5 bar



75% drift reduction



Guardian AIR Twin 110° Finer Air-induction Nozzles (see p15)

A twin spray with 30° incline forward and backwards to help penetration and spray distribution in denser crop canopies. Featuring an integral FastCap™.



2 star at 2-3 bar



Up to 50% drift reduction



Ultra Low Drift 120° Nozzles (see p16)

Significant reduction in drift from coarse air-filled droplets. Suitable for soil-active and translocated foliar sprays on larger targets.



90% drift reduction



Lo-Drift 110° Nozzles (see p17)

The original drift reducing nozzle. Spray is typically coarser than a conventional flat fan nozzle producing half the drift. Suitable for cereal fungicides and soil-acting herbicides.



Hypro Flat Fan 110° & 80° Nozzles (see p18 and p20)

Versatile nozzle suitable for application of herbicides, fungicides, insecticides and growth regulators. Mixed droplet spectrum suitable for a wide range of targets.



Hypro Flat Fan VP 110° & 80° Nozzles (see p19 and p21)

Can be used over pressures of 1 to 5 bar. Ideal for use with automatic rate control systems for spraying a wide range of pesticides.



VPTech Inclined Flat Fan 110° and 80° Nozzles (see p22 and p23)

A single 30° inclined spray. Alternate spray forward and back for vertical targets such as soil clods and small grass weeds and to help penetrate crop canopies.



Evenspray 80° Nozzles (see p24)

Non-tapering spray pattern designed specifically for non-overlapping applications such as band spraying of herbicides or knapsack sprayers.



Cone Spray SwirlTip Disc and Core 80° - 90° Nozzles (see p25)

Finely atomised droplets in hollow cone pattern. Designed for band spraying of contact acting chemicals. Can also be used with air blast and mist sprayers at higher pressure.



Flood Spray PoliJet and Deflectip Anvil 55° - 130° Nozzles (see p26)

Medium to coarse spray with uniform distribution. Resistant to clogging. PoliJet range is designed for use with knapsack sprayers.



ESI Liquid Fertiliser Nozzles (see p27)

One of the most compact liquid fertiliser nozzles on the market. A unique nozzle array and jet stabilising diffuser creates solid streams for excellent distribution of fertiliser and minimal crop scorch.



Hypro XT Nozzles for Boomless Spraying (see p28)

For applications where it is not possible to use a conventional spray boom or to extend spraying width at the boom end. Throws a coarse, even spray flat fan pattern. Ideal for use in forests, amenity or pastureland.



Hypro TwinCap (see p29)

Accommodates two spray nozzles back-to-back in the same bayonet cap. Increase spray volume without coarsening spray quality and 30° inclines direct spray under crop canopies.



Hypro FulcoTip (FCX) 80° Nozzles (For details see www.hypro-eu.com)

Full cone pattern. Suitable for spot spraying with knapsack sprayers. Medium to fine spray over 1-10 bar pressures. PART NUMBERS: 30FCX02 to 30FCX08.



Hypro HollowTip (HCX) 80° Nozzles (For details see www.hypro-eu.com)

Hollow cone pattern with finer spray quality over 1-10 bar pressures. PART NUMBERS: 30HCX2 to 30HCX18.



Misting Nozzles (For details see www.hypro-eu.com)

Designed to give extremely fine droplets suitable for humidification and evaporative cooling applications such as in grain storage, livestock areas and glasshouses.

All nozzles are designed to fit Hypro and most other standard caps. Threaded options are also available for most nozzle types. Most agricultural nozzles are manufactured from polyacetal material, other materials are also available.

Nozzles for Targets

To get the best chemical performance at the key spray timings, it is essential to choose the nozzle that gives good target coverage considering both the spray quality and a suitable incline.

PRE-EMERGENCE HERBICIDES

Good coverage over soil clods helps prevent weed escape. The absence of a crop can exacerbate spray drift for these applications.



Recommended nozzles:

Guardian AIR Twin: Reduces drift to help create more autumn spray days. Twin 30° inclines give effective coverage of soil clods. See page 15.



VPTech 80: A 30° inclined spray with mixed droplet spectrum. Suitable for spraying at boom heights of 60-75 cm. Alternate the spray forward and back for best results. See page 23.



HERBICIDES FOR SMALL GRASS WEEDS

It is important to get enough spray onto the leaves of small grass weeds. Choose the water volume and pressure that gives a medium fine spray quality.



Recommended nozzle:

VPTech 110: A 30° inclined spray with mixed droplet spectrum including fine droplets gives the best spray coverage. Alternate the spray incline forward and back. See page 22.



LIQUID FERTILISER APPLICATION

Even application across the boom is essential. A compact nozzle will minimise the risk of damage and fit onto a 3, 4 or 5 way nozzle body so changing nozzles is straightforward.

Recommended nozzle:



FastCap ESI: 6 jets are the optimum to achieve good fertiliser distribution whilst minimising the risk of outlet blockage. Stable streams help reduce the likelihood of crop scorch. See page 27.



CEREAL FUNGICIDE IN TANK MIX WITH HERBICIDE/PGR

Minimising drift will give more spray days at this busy time of year but not at the expense of good spray coverage. Spraying several chemicals in tank mix and using lower water volumes will also save spraying time.



Recommended nozzles:



Guardian AIR: A drift-reducing nozzle with good spray coverage at 3 bar and 100 l/ha water. The rearwards spray incline counteracts sprayer forward motion to direct spray downwards to leaves, stem bases and weeds. See page 14.



VP: Where a conventional flat fan spray is required, for example on smaller weeds, the standard VP nozzle with out an incline is preferred. See page 19 and 21.

OILSEED RAPE FUNGICIDES AND DESICCANTS

Getting coverage into the canopy is important for these applications. Where timing is important, for example with protectant sclerotinia sprays, using a drift-reducing nozzle helps to maximise spraying days.



Recommended nozzles:



Guardian AIR Twin: Twin 30° air inclusion sprays. Use at 3 bar to give an excellent balance of drift-reduction and spray coverage. See page 15.



VPTech: Alternate the 30° inclines to improve vertical spray distribution up and down the plant. See page 22

EAR SPRAY FUNGICIDES

Good spray coverage over both sides of the ear is important for effective disease protection. Using a drift-reducing nozzle can help widen the spraying window.



Recommended nozzles:



Guardian AIR: Slight incline gives good coverage on both the front and back of ear when used at 3 bar and 100 l/ha water. See page 14.



Guardian AIR Twin: Twin 30° incline also covers the ear. See page 15.

Nozzle Selection - Through the Spraying Year

	CROP STAGE AND CHEMICAL TYPE	TARGET	APPLICATION CHALLENGE
AUTUMN	Soil acting pre or early post-emergence herbicides	Soil	Even coverage of soil clods
	Insecticides	Small OSR or cereal plants	Small target area
	Post-emergence herbicides	Small grasses (less than 3 leaves)	Small target area, weeds may be shaded
SPRING	Post-emergence herbicides	Grasses (more than 3 leaves)	Vertical target orientation
	Post-emergence herbicides	Broad-leaved weeds (up to 2 cm across)	Small target area, weeds may be shaded
	Post-emergence herbicides	Broad-leaved weeds (2 - 5 cm across)	Weeds may be shaded
	Post-emergence herbicides	Broad leaved weeds (more than 5 cm across)	Penetration into crop canopy
	Eyespot fungicides and plant growth regulators	Crop stem and lower leaves	Penetration to base of crop
	Cereal fungicides T0, T1, T2	Crop leaves and leaf axils	Penetration into crop canopy
	OSR foliar fungicides	Crop leaves	Coverage from top to base
SUMMER	Potato blight fungicides	Crop leaves and stems	Keep water rates up for good coverage
	Ear fungicides (T3) and aphicides	Crop ear	Contact action important
	Desiccation with contact acting herbicide	Crop leaves and stems	Keep water rates up for good spray coverage
	Glyphosate	Larger weeds and crop desiccation	Not over-wetting leaf

Application guidelines are given for 3 bar pressure, 10-16 kph. At these pressures finer air induction nozzles such as Guardian AIR typically reduce drift by 50%, whilst coarser air induction nozzles such as Ultra Low Drift typically reduce drift by over 75%.

Always refer to the product label or the latest application advice from the agrochemical manufacturer before selecting a spray quality.

FLAT FAN		AIR INDUCTION		
MEDIUM		FINER		COARSER
				
VP	VPTECH 30° INCLINE	GUARDIAN AIR 10-13° INCLINE	GUARDIAN AIR TWIN 30° INCLINES	ULTRA LOW DRIFT
✓✓	✓✓✓	✓✓	✓✓✓	✓✓
✓✓✓	✓✓✓	✓✓	✓✓	-
✓✓	✓✓✓	-	✓	-
✓✓	✓✓✓	✓✓	✓✓	-
✓✓✓	✓✓	✓	✓	-
✓✓✓	✓✓	✓✓	✓✓	-
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✓✓✓	✓✓	✓✓✓	✓✓	✓
✓✓	✓✓✓	✓✓	✓✓✓	-
✓✓	✓✓✓	-	✓	-
✓✓	✓✓✓	✓✓✓	✓✓✓	-
✓✓	✓✓✓	-	-	-
✓✓	✓✓✓	✓✓	✓✓✓	✓✓

Best for efficacy

✓✓✓

Urgent spraying only

✓

Acceptable efficacy

✓✓

Not suitable

-

Guardian AIR 110° Finer Air-Induction Nozzles

Drift reducing nozzle with slight rear incline to compensate for forward motion of the sprayer. More droplets and better coverage than other air induction nozzles. Ideal for lower water rates. Suitable for a wide variety of applications to cereals, oilseed rape and other combinable crops. Holds spray pattern well at lower pressures. For optimum spray coverage use at 3 bar.

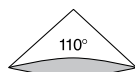


	PART NUMBER (REC FILTER MESH)	PRESS. BAR	FLOW L/MIN	APPLICATION RATES L/HA AT KM/H						LERAP RATING
				8KPH	10KPH	12KPH	14KPH	16KPH	18KPH	
Green	GA110-015AZ (100#)	1.0	0.346	52	42	35	30	26	23	★★★ 1-1.25 bar
		2.0	0.490	73	59	49	42	37	33	
		3.0	0.600	90	72	60	51	45	40	
		4.0	0.693	104	83	69	59	52	46	
		5.0	0.775	116	93	77	66	58	52	
Yellow	GA110-02AZ (100#)	1.0	0.462	69	55	46	40	35	31	★★★ 1-1.25 bar
		2.0	0.653	98	78	65	56	49	44	
		3.0	0.800	120	96	80	69	60	53	
		4.0	0.924	139	111	92	79	69	62	
		5.0	1.033	155	124	103	89	77	69	
Lilac	GA110-025AZ (100#)	1.0	0.577	87	69	58	49	43	38	★★★ 1-1.5 bar
		2.0	0.816	122	98	82	70	61	54	
		3.0	1.000	150	120	100	86	75	67	
		4.0	1.155	173	139	115	99	87	77	
		5.0	1.291	194	155	129	111	97	86	
Blue	GA110-03AZ (100#)	1.0	0.693	104	83	69	59	52	46	★★★ 1-1.5 bar
		2.0	0.980	147	118	98	84	73	65	
		3.0	1.200	180	144	120	103	90	80	
		4.0	1.386	208	166	139	119	104	92	
		5.0	1.550	232	186	155	133	116	103	
Brown Red	GA110-035AZ (100#)	1.0	0.808	121	97	81	69	61	54	★★★ 1-1.5 bar
		2.0	1.143	171	137	114	98	86	76	
		3.0	1.400	210	168	140	120	105	93	
		4.0	1.616	242	194	162	139	121	108	
		5.0	1.807	271	217	181	155	136	120	
Red	GA110-04AZ (50#)	1.0	0.924	139	111	92	79	69	62	★★★ 1-1.5 bar
		2.0	1.306	196	157	131	112	98	87	
		3.0	1.600	240	192	160	137	120	107	
		4.0	1.848	277	222	185	158	139	123	
		5.0	2.066	310	248	207	177	155	138	
Brown	GA110-05AZ (50#)	1.0	1.155	173	139	115	99	87	77	★★★ 1-1.5 bar
		2.0	1.633	245	196	163	140	122	109	
		3.0	2.000	300	240	200	171	150	133	
		4.0	2.309	346	277	231	198	173	154	
		5.0	2.582	387	310	258	221	194	172	

Spray quality is categorized as 'smaller droplets' by HGCA at 3 bar and is similar across different nozzle sizes when used at the same pressure.



75% drift reduction.



Application rates shown on this chart are based upon tests at 3 bar and 50cm nozzle spacings.

ORDERING: Use codes shown, also available as bags of 50 with a usage card [order by adding '_bag 50' to code]. Available as FastCap versions including cap and gasket; precede part number with FC-, e.g. FC-GA110-03AZ.

Guardian AIR Twin 110° Air-Induction Nozzles



A twin spray with 30° incline forward and backward to help penetration and spray distribution in denser crop canopies. Based on the finer air-inclusion spray quality of the Guardian AIR nozzle and featuring an integral FastCap.

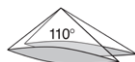
	PART NUMBER (REC FILTER MESH)	PRESS. BAR	FLOW L/MIN	APPLICATION RATES L/HA AT KM/H						LERAP RATING
				8KPH	10KPH	12KPH	14KPH	16KPH	18KPH	
Yellow	GAT110-02PK10 (100#)	2.0	0.653	98	78	65	56	49	44	★★ 2.0-2.25 bar
		3.0	0.800	120	96	80	69	60	53	
		4.0	0.924	139	111	92	79	69	62	
		5.0	1.033	155	124	103	89	77	69	
Lilac	GAT110-025PK10 (100#)	2.0	0.816	122	98	82	70	61	54	★★ 2.0-2.25 bar
		3.0	1.000	150	120	100	86	75	67	
		4.0	1.155	173	139	115	99	87	77	
		5.0	1.291	194	155	129	111	97	86	
Blue	GAT110-03PK10 (100#)	2.0	0.980	147	118	98	84	73	65	★★ 2.0-3.0 bar
		3.0	1.200	180	144	120	103	90	80	
		4.0	1.386	208	166	139	119	104	92	
		5.0	1.550	232	186	155	133	116	103	
Brown Red	GAT110-035PK10 (100#)	2.0	1.143	171	137	114	98	86	76	★★ 2.0-2.5 bar
		3.0	1.400	210	168	140	120	105	93	
		4.0	1.616	242	194	162	139	121	108	
		5.0	1.807	271	217	181	155	136	120	
Red	GAT110-04PK10 (50#)	2.0	1.306	196	157	131	112	98	87	★ 2.0-3.0 bar
		3.0	1.600	240	192	160	137	120	107	
		4.0	1.848	277	222	185	158	139	123	
		5.0	2.066	310	248	207	177	155	138	
Brown	GAT110-05PK10 (50#)	2.0	1.633	245	196	163	140	122	109	★★ 2.0-3.0 bar
		3.0	2.000	300	240	200	171	150	133	
		4.0	2.309	346	277	231	198	173	154	
		5.0	2.582	387	310	258	221	194	172	
Grey	GAT110-06PK10 (50#)	2.0	1.960	294	235	196	168	147	131	★★ 2.0-3.0 bar
		3.0	2.400	360	288	240	206	180	160	
		4.0	2.771	416	333	277	238	208	185	
		5.0	3.098	465	372	310	266	232	207	
White	GAT110-08PK10 (50#)	2.0	2.613	392	314	261	224	196	174	★★ 2.0-3.0 bar
		3.0	3.200	480	384	320	274	240	213	
		4.0	3.695	554	443	370	317	277	246	
		5.0	4.131	620	496	413	354	310	275	



2 Star 50-75% drift reduction



50% drift reduction.



Spray quality is consistent across different nozzle sizes when used at the same pressure. Application rates shown in this chart are based on tests at 3 bar and 50 cm nozzle spacing.

ORDERING: For Guardian AIR Twin nozzles sold in packs of 10, use codes shown. For single nozzles use part no. GAT110-OXA. GuardianAIR Twin spares: Seal 65-BS205, Cage 30Q3579A, A filter can be used in place of the cage, see page 32.

Ultra Low Drift 120° Nozzles

Significant reduction in drift from coarse air-filled droplets. For spraying in the widest weather window. Suitable for soil-active and translocated foliar sprays on larger targets (e.g. glyphosate, cereal fungicides). Avoid for smaller targets and contact acting chemicals. Replaces Drift BETA.



	PART NUMBER (REC FILTER MESH)	PRESS. BAR	FLOW L/MIN	APPLICATION RATES L/HA AT KM/H						JKI RATING
				8KPH	10KPH	12KPH	14KPH	16KPH	18KPH	
Green	ULD120-015 (100#)	2.0	0.490	73	59	49	42	37	33	
		3.0	0.600	90	72	60	51	45	40	
		4.0	0.693	104	83	69	59	52	46	
		5.0	0.775	116	93	77	66	58	52	
		6.0	0.849	127	102	85	73	64	57	
Yellow	ULD120-02 (100#)	2.0	0.653	98	78	65	56	49	44	
		3.0	0.800	120	96	80	69	60	53	
		4.0	0.924	139	111	92	79	69	62	
		5.0	1.033	155	124	103	89	77	69	
		6.0	1.131	170	136	113	97	85	75	
Lilac	ULD120-025 (100#)	2.0	0.816	122	98	82	70	61	54	
		3.0	1.000	150	120	100	86	75	67	
		4.0	1.155	173	139	115	99	87	77	
		5.0	1.291	194	155	129	111	97	86	
		6.0	1.414	212	170	141	121	106	94	
Blue	ULD120-03 (100#)	2.0	0.980	147	118	98	84	73	65	50% 2.5-8 bar
		3.0	1.200	180	144	120	103	90	80	
		4.0	1.386	208	166	139	119	104	92	
		5.0	1.550	232	186	155	133	116	103	
		6.0	1.697	255	204	170	145	127	113	
Red	ULD120-04 (50#)	2.0	1.306	196	157	131	112	98	87	90% 2.5-3 bar
		3.0	1.600	240	192	160	137	120	107	
		4.0	1.848	277	222	185	158	139	123	
		5.0	2.066	310	248	207	177	155	138	
		6.0	2.263	339	272	226	194	170	151	
Brown	ULD120-05 (50#)	2.0	1.633	245	196	163	140	122	109	90% 2.5-8 bar
		3.0	2.000	300	240	200	171	150	133	
		4.0	2.309	346	277	231	198	173	154	
		5.0	2.582	387	310	258	221	194	172	
		6.0	2.828	424	339	283	242	212	189	
Grey	ULD120-06 (50#)	2.0	1.960	294	235	196	168	147	131	
		3.0	2.400	360	288	240	206	180	160	
		4.0	2.771	416	333	277	238	208	185	
		5.0	3.098	465	372	310	266	232	207	
		6.0	3.394	509	407	339	291	255	226	



Up to 90% drift reduction.

Application rates shown on this chart are based upon tests at 3 bar and 50cm nozzle spacing.
ORDERING: Use part numbers shown.



Lo-Drift 110° Nozzles



The original drift reducing nozzle. Spray is typically coarser than a conventional flat fan nozzle producing half the drift. Trials show these work well with cereal fungicides and autumn residual herbicides.

	PART NUMBER (REC FILTER MESH)	PRESS. BAR	FLOW L/MIN	APPLICATION RATES L/HA AT KM/H						BCPC NOZZLE CODE
				8KPH	10KPH	12KPH	14KPH	16KPH	18KPH	
Green*	LD110-015 (100#)	2.0	0.490	73	59	49	42	37	33	FRD110/0.6/3
		3.0	0.600	90	72	60	51	45	40	
		4.0	0.693	104	83	69	59	52	46	
Yellow*	LD110-02 (100#)	2.0	0.653	98	78	65	56	49	44	FRD110/0.8/3
		3.0	0.800	120	96	80	69	60	53	
		4.0	0.924	139	111	92	79	69	62	
Lilac*	LD110-025 (100#)	2.0	0.816	122	98	82	70	61	54	FRD110/1.0/3
		3.0	1.000	150	120	100	86	75	67	
		4.0	1.155	173	139	115	99	87	77	
Blue*	LD110-03 (100#)	2.0	0.980	147	118	98	84	73	65	FRD110/1.2/3
		3.0	1.200	180	144	120	103	90	80	
		4.0	1.386	208	166	139	119	104	92	
Red*	LD110-04 (50#)	2.0	1.306	196	157	131	112	98	87	FRD110/1.6/3
		3.0	1.600	240	192	160	137	120	107	
		4.0	1.848	277	222	185	158	139	123	
Brown*	LD110-05 (50#)	2.0	1.633	245	196	163	140	122	109	FRD110/2.0/3
		3.0	2.000	300	240	200	171	150	133	
		4.0	2.309	346	277	231	198	173	154	
Grey*	LD110-06 (50#)	2.0	1.960	294	235	196	168	147	131	FRD110/2.4/3  at 2-3 bar
		3.0	2.400	360	288	240	206	180	160	
		4.0	2.771	416	333	277	238	208	185	
White	LD110-08 (50#)	2.0	2.613	392	314	261	224	196	174	FRD110/3.2/3
		3.0	3.200	480	384	320	274	240	213	
		4.0	3.695	554	443	370	317	277	246	

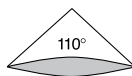
BCPC CODING

FINE

MEDIUM

COARSE

*Also available as 80° nozzles



Application rates shown on this chart are based upon tests at 3 bar and 50cm nozzle spacings.
ORDERING: Use part numbers shown.

Hypro Flat Fan 110° Nozzles

Versatile nozzle suitable for the overall application of herbicides, fungicides, insecticides and growth regulators. Mixed droplet spectrum to ensure effective spray coverage on a wide range of targets.

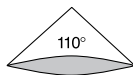


	PART NUMBER (REC FILTER MESH)	PRESS. BAR	FLOW L/MIN	APPLICATION RATES L/HA AT KM/H						BCPC NOZZLE CODE
				8KPH	10KPH	12KPH	14KPH	16KPH	18KPH	
Orange	F110-01 (100#)	2.0	0.327	49	39	33	28	24	22	F110/0.4/3
		3.0	0.400	60	48	40	34	30	27	
		4.0	0.462	69	55	46	40	35	31	
Green	F110-015 (100#)	2.0	0.490	73	59	49	42	37	33	F110/0.6/3
		3.0	0.600	90	72	60	51	45	40	
		4.0	0.693	104	83	69	59	52	46	
Yellow	F110-02 (100#)	2.0	0.653	98	78	65	56	49	44	F110/0.8/3
		3.0	0.800	120	96	80	69	60	53	
		4.0	0.924	139	111	92	79	69	62	
Lilac	F110-025 (100#)	2.0	0.816	122	98	82	70	61	54	F110/1.0/3
		3.0	1.000	150	120	100	86	75	67	
		4.0	1.155	173	139	115	99	87	77	
Blue	F110-03 (100#)	2.0	0.980	147	118	98	84	73	65	F110/1.2/3
		3.0	1.200	180	144	120	103	90	80	
		4.0	1.386	208	166	139	119	104	92	
Red	F110-04 (50#)	2.0	1.306	196	157	131	112	98	87	F110/1.6/3
		3.0	1.600	240	192	160	137	120	107	
		4.0	1.848	277	222	185	158	139	123	
Brown	F110-05 (50#)	2.0	1.633	245	196	163	140	122	109	F110/2.0/3
		3.0	2.000	300	240	200	171	150	133	
		4.0	2.309	346	277	231	198	173	154	
Grey	F110-06 (50#)	2.0	1.960	294	235	196	168	147	131	F110/2.4/3
		3.0	2.400	360	288	240	206	180	160	
		4.0	2.771	416	333	277	238	208	185	
White	F110-08 (50#)	2.0	2.613	392	314	261	224	196	174	F110/3.2/3
		3.0	3.200	480	384	320	274	240	213	
		4.0	3.695	554	443	370	317	277	246	
Light Blue	F110-10 (30#)	2.0	3.266	490	392	327	280	245	218	F110/4.0/3
		3.0	4.000	600	480	400	343	300	267	
		4.0	4.619	693	554	462	396	346	308	
Light Green	F110-15 (30#)	2.0	4.899	735	588	490	420	367	327	F110/6.0/3
		3.0	6.000	900	720	600	514	450	400	
		4.0	6.928	1039	831	693	594	520	462	
Black	F110-20 (30#)	2.0	6.532	980	784	653	560	490	435	F110/8.0/3
		3.0	8.000	1200	960	800	686	600	533	
		4.0	9.238	1386	1109	924	792	693	616	

BCPC CODING

FINE **MEDIUM** **COARSE**

Application rates shown on this chart are based upon tests at 3 bar and 50cm nozzle spacings.
ORDERING: Use part numbers shown. Also available in PVDF.



Hypro Flat Fan VP 110° Nozzles



Flat fan nozzle that maintains spray angle very well over variable pressures of 1 to 5 bar. Ideal for use with automatic rate control systems for spraying a wide range of pesticides.

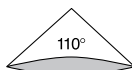
	PART NUMBER (REC FILTER MESH)	PRESS. BAR	FLOW L/MIN	APPLICATION RATES L/HA AT KM/H						BCPC NOZZLE CODE
				8KPH	10KPH	12KPH	14KPH	16KPH	18KPH	
Green	VP110-015 (100#)	1.0	0.346	52	42	35	30	26	23	F110/0.6/3
		2.0	0.490	73	59	49	42	37	33	
		3.0	0.600	90	72	60	51	45	40	
		4.0	0.693	104	83	69	59	52	46	
		5.0	0.775	116	93	77	66	58	52	
Yellow	VP110-02 (100#)	1.0	0.462	69	55	46	40	35	31	F110/0.8/3
		2.0	0.653	98	78	65	56	49	44	
		3.0	0.800	120	96	80	69	60	53	
		4.0	0.924	139	111	92	79	69	62	
		5.0	1.033	155	124	103	89	77	69	
Lilac	VP110-025 (100#)	1.0	0.577	87	69	58	49	43	38	F110/1.0/3
		2.0	0.816	122	98	82	70	61	54	
		3.0	1.000	150	120	100	86	75	67	
		4.0	1.155	173	139	115	99	87	77	
		5.0	1.291	194	155	129	111	97	86	
Blue	VP110-03 (100#)	1.0	0.693	104	83	69	59	52	46	F110/1.2/3
		2.0	0.980	147	118	98	84	73	65	
		3.0	1.200	180	144	120	103	90	80	
		4.0	1.386	208	166	139	119	104	92	
		5.0	1.549	232	186	155	133	116	103	
Brown Red	VP110-35 (50#)	1.0	0.808	121	97	81	69	61	54	F110/1.4/3
		2.0	1.143	171	137	114	98	86	76	
		3.0	1.400	210	168	140	120	105	93	
		4.0	1.616	242	194	162	139	121	108	
		5.0	1.807	271	217	181	155	136	120	
Red	VP110-04 (50#)	1.0	0.924	139	111	92	79	69	62	F110/1.6/3
		2.0	1.306	196	157	131	112	98	87	
		3.0	1.600	240	192	160	137	120	107	
		4.0	1.848	277	222	185	158	139	123	
		5.0	2.066	310	248	207	177	155	138	
Brown	VP110-05 (50#)	1.0	1.155	173	139	115	99	87	77	F110/2.0/3
		2.0	1.633	245	196	163	140	122	109	
		3.0	2.000	300	240	200	171	150	133	
		4.0	2.309	346	277	231	198	173	154	
		5.0	2.582	387	310	258	221	194	172	
Grey	VP110-06 (50#)	1.0	1.386	208	166	139	119	104	92	F110/2.4/3
		2.0	1.960	294	235	196	168	147	131	
		3.0	2.400	360	288	240	206	180	160	
		4.0	2.771	416	333	277	238	208	185	
		5.0	3.098	465	372	310	266	232	207	

BCPC CODING

FINE

MEDIUM

COARSE



Also available in sizes: VP08, VP10, VP15.

Application rates shown on this chart are based upon tests at 3 bar and 50cm nozzle spacings.

ORDERING: Use part numbers shown.

Hypro Flat Fan 80° Nozzles

Versatile nozzle suitable for the overall application of herbicides, fungicides, insecticides and growth regulators. Mixed droplet spectrum for effective coverage on a wide range of targets. An 80° angle nozzle is ideal where the boom is 60-75 cm above the target. Slightly coarser spray quality than the 110° nozzle.



	PART NUMBER (REC FILTER MESH)	PRESS. BAR	FLOW L/MIN	APPLICATION RATES L/HA AT KM/H						BCPC NOZZLE CODE
				8KPH	10KPH	12KPH	14KPH	16KPH	18KPH	
Orange	F80-01 (100#)	2.0	0.327	49	39	33	28	24	22	F80/0.4/3
		3.0	0.400	60	48	40	34	30	27	
		4.0	0.462	69	55	46	40	35	31	
Green	F80-015 (100#)	2.0	0.490	73	59	49	42	37	33	F80/0.6/3
		3.0	0.600	90	72	60	51	45	40	
		4.0	0.693	104	83	69	59	52	46	
Yellow	F80-02 (100#)	2.0	0.653	98	78	65	56	49	44	F80/0.8/3
		3.0	0.800	120	96	80	69	60	53	
		4.0	0.924	139	111	92	79	69	62	
Lilac	F80-025 (100#)	2.0	0.816	122	98	82	70	61	54	F80/1.0/3
		3.0	1.000	150	120	100	86	75	67	
		4.0	1.155	173	139	115	99	87	77	
Blue	F80-03 (100#)	2.0	0.980	147	118	98	84	73	65	F80/1.2/3
		3.0	1.200	180	144	120	103	90	80	
		4.0	1.386	208	166	139	119	104	92	
Red	F80-04 (50#)	2.0	1.306	196	157	131	112	98	87	F80/1.6/3
		3.0	1.600	240	192	160	137	120	107	
		4.0	1.848	277	222	185	158	139	123	
Brown	F80-05 (50#)	2.0	1.633	245	196	163	140	122	109	F80/2.0/3
		3.0	2.000	300	240	200	171	150	133	
		4.0	2.309	346	277	231	198	173	154	
Grey	F80-06 (50#)	2.0	1.960	294	235	196	168	147	131	F80/2.4/3
		3.0	2.400	360	288	240	206	180	160	
		4.0	2.771	416	333	277	238	208	185	
White	F80-08 (50#)	2.0	2.613	392	314	261	224	196	174	F80/3.2/3
		3.0	3.200	480	384	320	274	240	213	
		4.0	3.695	554	443	370	317	277	246	
Light Blue	F80-10 (30#)	2.0	3.266	490	392	327	280	245	218	F80/4.0/3
		3.0	4.000	600	480	400	343	300	267	
		4.0	4.619	693	554	462	396	346	308	
Light Green	F80-15 (30#)	2.0	4.899	735	588	490	420	367	327	F80/6.0/3
		3.0	6.000	900	720	600	514	450	400	
		4.0	6.928	1039	831	693	594	520	462	
Black	F80-20 (30#)	2.0	6.532	980	784	653	560	490	435	F80/8.0/3
		3.0	8.000	1200	960	800	686	600	533	
		4.0	9.238	1386	1109	924	792	693	616	

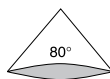
BCPC CODING

FINE

MEDIUM

COARSE

Application rates shown on this chart are based upon tests at 3 bar and 50cm nozzle spacings which gives overlap when boom set at 60 and 120 cm. ORDERING: Use part numbers shown.



Hypro Flat Fan VP 80° Nozzles



Flat fan nozzle with excellent spray patternation maintained over variable pressures of 1 to 5 bar. Ideal for use with automatic rate control systems for spraying a wide range of pesticides. An 80° angle nozzle is ideal where the boom is 60-75 cm from the target. Slightly coarser spray quality than the 110° nozzle.

	PART NUMBER (REC FILTER MESH)	PRESS. BAR	FLOW L/MIN	APPLICATION RATES L/HA AT KM/H						BCPC NOZZLE CODE
				8KPH	10KPH	12KPH	14KPH	16KPH	18KPH	
Green	VP80-015 (100#)	1.0	0.346	52	42	35	30	26	23	F110/0.6/3
		2.0	0.490	73	59	49	42	37	33	
		3.0	0.600	90	72	60	51	45	40	
		4.0	0.693	104	83	69	59	52	46	
		5.0	0.775	116	93	77	66	58	52	
Yellow	VP80-02 (100#)	1.0	0.462	69	55	46	40	35	31	F110/0.8/3
		2.0	0.653	98	78	65	56	49	44	
		3.0	0.800	120	96	80	69	60	53	
		4.0	0.924	139	111	92	79	69	62	
		5.0	1.033	155	124	103	89	77	69	
Blue	VP80-03 (100#)	1.0	0.693	104	83	69	59	52	46	F110/1.2/3
		2.0	0.980	147	118	98	84	73	65	
		3.0	1.200	180	144	120	103	90	80	
		4.0	1.386	208	166	139	119	104	92	
		5.0	1.549	232	186	155	133	116	103	
Red	VP80-04 (50#)	1.0	0.924	139	111	92	79	69	62	F110/1.6/3
		2.0	1.306	196	157	131	112	98	87	
		3.0	1.600	240	192	160	137	120	107	
		4.0	1.848	277	222	185	158	139	123	
		5.0	2.066	310	248	207	177	155	138	
Brown	VP80-05 (50#)	1.0	1.155	173	139	115	99	87	77	F110/2.0/3
		2.0	1.633	245	196	163	140	122	109	
		3.0	2.000	300	240	200	171	150	133	
		4.0	2.309	346	277	231	198	173	154	
		5.0	2.582	387	310	258	221	194	172	
Grey	VP80-06 (50#)	1.0	1.386	208	166	139	119	104	92	F110/2.4/3
		2.0	1.960	294	235	196	168	147	131	
		3.0	2.400	360	288	240	206	180	160	
		4.0	2.771	416	333	277	238	208	185	
		5.0	3.098	465	372	310	266	232	207	

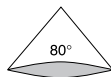
BCPC CODING

FINE

MEDIUM

COARSE

Application rates shown on this chart are based upon tests at 3 bar and 50cm nozzle spacings which gives overlap when boom set at 60 and 120 cm. ORDERING: Use part numbers shown.



VP Tech 110° Inclined Flat Fan Nozzles

A single 30° inclined spray ideal for achieving good spray coverage on vertical targets such as soil clods and small grass weeds and penetrating into crop canopies. Alternate incline direction along the boom. Consists of one VP flat fan nozzle, a removable blanking insert and a seal in a standard TwinCap.



PART NUMBER (REC FILTER MESH)		PRESS.BAR	FLOW L/MIN	APPLICATION RATES L/HA AT KM/H					
				8KPH	10KPH	12KPH	14KPH	16KPH	18KPH
Yellow	VPT110-02 (100#)	1.0	0.462	69	55	46	40	35	31
		2.0	0.653	98	78	65	56	49	44
		3.0	0.800	120	96	80	69	60	53
		4.0	0.924	139	111	92	79	69	62
		5.0	1.033	155	124	103	89	77	69
Lilac	VPT110-025 (100#)	1.0	0.577	87	69	58	49	43	38
		2.0	0.816	122	98	82	70	61	54
		3.0	1.000	150	120	100	86	75	67
		4.0	1.155	173	139	115	99	87	77
		5.0	1.291	194	155	129	111	97	86
Blue	VPT110-03 (100#)	1.0	0.693	104	83	69	59	52	46
		2.0	0.980	147	118	98	84	73	65
		3.0	1.200	180	144	120	103	90	80
		4.0	1.386	208	166	139	119	104	92
		5.0	1.549	232	186	155	133	116	103
Brown Red	VPT110-035 (100#)	1.0	0.808	121	97	81	69	61	54
		2.0	1.143	171	137	114	98	86	76
		3.0	1.400	210	168	140	120	105	93
		4.0	1.616	242	194	162	139	121	108
		5.0	1.807	271	217	181	155	136	120
Red	VPT110-04 (50#)	1.0	0.924	139	111	92	79	69	62
		2.0	1.306	196	157	131	112	98	87
		3.0	1.600	240	192	160	137	120	107
		4.0	1.848	277	222	185	158	139	123
		5.0	2.066	310	248	207	177	155	138
Brown	VPT110-05 (50#)	1.0	1.155	173	139	115	99	87	77
		2.0	1.633	245	196	163	140	122	109
		3.0	2.000	300	240	200	171	150	133
		4.0	2.309	346	277	231	198	173	154
		5.0	2.582	387	310	258	221	194	172
Grey	VPT110-06 (50#)	1.0	1.386	208	166	139	119	104	92
		2.0	1.960	294	235	196	168	147	131
		3.0	2.400	360	288	240	206	180	160
		4.0	2.771	416	333	277	238	208	185
		5.0	3.098	465	372	310	266	232	207

BCPC CODING

FINE

MEDIUM

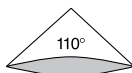
COARSE

Application rates shown on this chart are based upon tests at 3 bar and 50cm nozzle spacings.

Supplied ready to fit standard EF3 nozzle body. ORDERING: use part numbers shown.

Hardi versions also available. To order add "-H" to relevant part number.

Sealing washer (pt no: 22W11MF64) and blanking insert (pt no: 30Q3834) are available as spares.



VP Tech 80° Inclined Flat Fan Nozzles



A single 30° inclined spray ideal for achieving good spray coverage on vertical targets such as soil clods and small grass weeds and penetrating into crop canopies. Alternate incline direction along the boom. Consists of one VP flat fan nozzle, a removable blanking insert and a seal in a standard TwinCap. Slightly coarser spray quality than the 110° nozzle.

	PART NUMBER (REC FILTER MESH)	PRESS. BAR	FLOW L/MIN	APPLICATION RATES L/HA AT KM/H					
				8KPH	10KPH	12KPH	14KPH	16KPH	18KPH
Yellow	VPT80-02 (100#)	1.0	0.462	69	55	46	40	35	31
		2.0	0.653	98	78	65	56	49	44
		3.0	0.800	120	96	80	69	60	53
		4.0	0.924	139	111	92	79	69	62
		5.0	1.033	155	124	103	89	77	69
Blue	VPT80-03 (100#)	1.0	0.693	104	83	69	59	52	46
		2.0	0.980	147	118	98	84	73	65
		3.0	1.200	180	144	120	103	90	80
		4.0	1.386	208	166	139	119	104	92
		5.0	1.549	232	186	155	133	116	103
Red	VPT80-04 (50#)	1.0	0.924	139	111	92	79	69	62
		2.0	1.306	196	157	131	112	98	87
		3.0	1.600	240	192	160	137	120	107
		4.0	1.848	277	222	185	158	139	123
		5.0	2.066	310	248	207	177	155	138
Brown	VPT80-05 (50#)	1.0	1.155	173	139	115	99	87	77
		2.0	1.633	245	196	163	140	122	109
		3.0	2.000	300	240	200	171	150	133
		4.0	2.309	346	277	231	198	173	154
		5.0	2.582	387	310	258	221	194	172
Grey	VPT80-06 (50#)	1.0	1.386	208	166	139	119	104	92
		2.0	1.960	294	235	196	168	147	131
		3.0	2.400	360	288	240	206	180	160
		4.0	2.771	416	333	277	238	208	185
		5.0	3.098	465	372	310	266	232	207

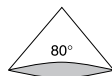
BCPC CODING

FINE

MEDIUM

COARSE

Application rates shown on this chart are based upon tests at 3 bar and 50cm nozzle spacings which gives overlap when boom set at 60 and 120 cm. Supplied ready to fit standard EF3 nozzle body. Hardi bayonet versions also available (to order add "-H" to relevant part number). ORDERING: use part numbers shown. Sealing washer (pt no: 22W11MF64) and blanking insert (pt no: 30Q3834) are available as spares.



Hypro EvenSpray 80° Nozzles

Ideal for use with knapsack sprayers, the speeds and application rates shown here are for single nozzle applications at walking speeds. This nozzle can also be used for band spraying [see calculation on page 52 to determine nozzle size that is required].



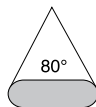
	PART NO. (REC FILTER MESH)	SPRAY WIDTH* (50 CM HEIGHT)	PRESS. BAR	FLOW L/MIN	SINGLE NOZZLE APPLICATION RATES L/HA AT KM/H				BCPC NOZZLE CODE
					2KPH	3KPH	4KPH	5KPH	
Orange	E80-01 (100#)	0.84m	2.0	0.327	117	78	58	47	FE80/0.4/3
			3.0	0.400	143	95	71	57	
			4.0	0.462	165	110	82	66	
Green	E80-015 (100#)	0.84m	2.0	0.490	175	117	87	70	FE80/0.6/3
			3.0	0.600	214	143	107	86	
			4.0	0.693	247	165	124	99	
Yellow	E80-02 (80#)	0.84m	2.0	0.653	233	156	117	93	FE80/0.8/3
			3.0	0.800	286	190	143	114	
			4.0	0.924	330	220	165	132	
Blue	E80-03 (80#)	0.84m	2.0	0.980	350	233	175	140	FE80/1.2/3
			3.0	1.200	429	286	214	171	
			4.0	1.386	495	330	247	198	
Red	E80-04 (50#)	0.84m	2.0	1.306	467	311	233	187	FE80/1.6/3
			3.0	1.600	571	381	286	229	
			4.0	1.848	660	440	330	264	
Brown	E80-05 (50#)	0.8m	2.0	1.633	583	389	292	233	FE80/2.0/3
			3.0	2.000	714	476	357	286	
			4.0	2.309	825	550	412	330	
Grey	E80-06 (50#)	0.84m	2.0	1.960	700	467	350	280	FE80/2.4/3
			3.0	2.400	857	571	429	343	
			4.0	2.771	990	660	495	396	
White	E80-08 (50#)	0.84m	2.0	2.613	933	622	467	373	FE80/3.2/3
			3.0	3.200	1143	762	571	457	
			4.0	3.698	1320	880	660	528	

BCPC CODING FINE MEDIUM COARSE

*Spray angle and widths given are at 3 bar

Application rates on this chart are based upon tests at 3 bar pressure.

ORDERING: Use part numbers as shown.



Hollow Cone Disc and Core 80° - 90° Nozzles



Finely atomised droplets in hollow cone pattern. Designed for band spraying of contact acting chemicals. Can also be used with air blast and mist sprayers at higher pressures.

DISC	CORE	PART NUMBERS (SPRAY ANGLE)	PRESS. BAR	FLOW L/MIN	APPLICATION RATES L/HA at Km/H			BCPC NOZZLE CODE
					8KPH	10KPH	12KPH	
		30-DC-04 30-CR-13 (80°)	3	0.47	56	47	35	HC/0.47/3
			4	0.54	65	54	41	
			5	0.61	73	61	46	
		30-DC-04 30-CR-23 (80°)	3	0.59	71	59	44	HC/0.59/3
			4	0.68	82	68	51	
			5	0.76	91	76	57	
		30-DC-05 30-CR-23 (90°)	3	0.71	85	71	53	HC/0.71/3
			4	0.82	98	82	62	
			5	0.92	110	92	69	
		30-DC-06 30-CR-23 (90°)	3	0.83	100	83	62	HC/0.83/3
			4	0.96	115	96	72	
			5	1.07	129	107	80	
		30-DC-05 30-CR-25 (80°)	3	1.38	166	138	104	HC/1.38/3
			4	1.59	191	159	119	
			5	1.78	214	178	134	
		30-DC-06 30-CR-25 (85°)	3	1.74	209	174	131	HC/1.74/3
			4	2.00	240	200	150	
			5	2.24	269	224	168	
		30-DC-07 30-CR-25 (90°)	3	2.05	246	205	154	HC/2.05/3
			4	2.37	284	237	178	
			5	2.65	318	265	199	
		30-DC-06 30-CR-45 (95°)	3	2.29	275	229	181	HC/2.29/3
			4	2.64	317	264	198	
			5	2.96	355	296	222	
		30-DC-08 30-CR-25 (80°)	3	2.41	289	241	181	HC/2.41/3
			4	2.78	334	278	209	
			5	3.11	373	311	233	
		30-DC-07 30-CR-45 (85°)	3	2.68	322	268	201	HC/2.68/3
			4	3.10	371	310	232	
			5	3.46	415	346	260	
		30-DC-08 30-CR-45 (90°)	3	3.32	398	332	249	HC/3.32/3
			4	3.83	460	383	287	
			5	4.29	514	492	321	

BCPC CODING

FINE **MEDIUM** **COARSE**

Application rates shown on this chart are based on tests at 3 bar and 50cm nozzle spacings.
ORDERING: Both disc and core are required. Use part numbers shown.



Deflectip (DT) and Polijet (AN) Anvil Nozzles

Medium coarse spray, with uniform distribution and resistance to clogging. The AN (Polijet) range is designed for use with knapsack sprayers, offering the same application rate at a the choice of spray widths. Speeds shown reflect single nozzles and walking pace.



	PART NUMBER (REC FILTER MESH)	SPRAY ANGLE	SPRAY WIDTH* (50 CM HEIGHT)	PRESS. BAR	FLOW L/MIN	SINGLE NOZZLE APPLICATION RATES L/HA AT KM/H				BCPC NOZZLE CODE
						2KPH	3KPH	4KPH	5KPH	
Orange	30DT0.5 (100#)	80°	0.84m	1.0	0.23	81	54	41	33	D/0.23/1
				2.0	0.32	115	77	58	46	
				3.0	0.39	141	94	71	56	
Green	30DT0.75 (100#)	95°	1.09m	1.0	0.34	94	63	47	38	D/0.34/1
				2.0	0.48	133	89	66	53	
				3.0	0.59	163	109	81	65	
Yellow	30DT1.0 (100#)	105°	1.30m	1.0	0.46	105	70	52	42	D/0.46/1
				2.0	0.64	148	99	74	59	
				3.0	0.79	182	121	91	73	
Blue	30DT1.5 (100#)	105°	1.30m	1.0	0.68	157	105	79	63	D/0.68/1
				2.0	0.97	223	148	111	89	
				3.0	1.18	273	182	136	109	
Red	30DT2.0 (50#)	105°	1.30m	1.0	0.91	210	140	105	84	D/0.91/1
				2.0	1.29	298	198	149	119	
				3.0	1.58	365	243	182	146	
Brown	30DT2.5 (50#)	110°	1.43m	1.0	1.14	239	159	120	95	D/1.14/1
				2.0	1.61	337	225	169	135	
				3.0	1.97	413	276	207	165	
Grey	30DT3.0 (50#)	110°	1.43m	1.0	1.37	287	192	143	115	D/1.37/1
				2.0	1.93	405	270	202	162	
				3.0	2.37	497	331	249	199	

	PART NUMBER (REC FILTER MESH)	SPRAY ANGLE	SPRAY WIDTH* (50 CM HEIGHT)	PRESS. BAR	FLOW L/MIN	SINGLE NOZZLE APPLICATION RATES L/HA AT KM/H				BCPC NOZZLE CODE
						2KPH	3KPH	4KPH	5KPH	
Yellow	30AN0.6 (100#)	53°	0.50m	1.0	0.60	360	240	180	144	D/0.6/1
				2.0	0.85	509	339	255	204	
				3.0	1.04	624	416	312	249	
Green	30AN1.2 (50#)	90°	1.00m	1.0	1.20	360	240	180	144	D/1.2/1
				2.0	1.70	509	339	255	204	
				3.0	2.08	624	416	312	249	
Blue	30AN1.8 (50#)	113°	1.51m	1.0	1.80	360	240	180	144	D/1.8/1
				2.0	2.55	509	339	255	204	
				3.0	3.12	624	416	312	249	
Red	30AN2.4 (50#)	127°	2.01m	1.0	2.40	360	240	180	144	D/2.4/1
				2.0	3.39	509	339	255	204	
				3.0	4.16	624	416	312	249	

*Spray angle and widths given are at 3 bar

BCPC CODING

FINE

MEDIUM

COARSE

Application rates given refer to single nozzle application at 50 cm above target.
ORDERING: Use part number shown. DeflecTip nozzles suitable for tractor spraying speeds are also available in sizes: DT4.0, DT5.0, DT7.5, DT10, DT15 & DT20.





Hypro's liquid fertiliser dribble cap is one of the most compact on the market. A unique nozzle array and jet stabilising diffuser creates solid streams for excellent distribution and minimal crop scorch. Available in sizes 015 to 06 and 20 with polyacetal metering discs, and sizes 08, 10 and 15 with ceramic metering discs.

PART NUMBER		PRESS. BAR	FLOW L/MIN	APPLICATION RATES L/HA AT KM/H					
				8KPH	10KPH	12KPH	14KPH	16KPH	18KPH
Green	FC-HESI-110015P (6 pack)	1.0	0.346	52	42	35	30	26	23
		2.0	0.490	73	59	49	42	37	33
		3.0	0.600	90	72	60	51	45	40
		4.0	0.693	104	83	69	59	52	46
Yellow	FC-HESI-11002P (6 pack)	1.0	0.462	69	55	46	40	35	31
		2.0	0.653	98	78	65	56	49	44
		3.0	0.800	120	96	80	69	60	53
		4.0	0.924	139	111	92	79	69	62
Blue	FC-HESI-11003P (6 pack)	1.0	0.693	104	83	69	59	52	46
		2.0	0.980	147	118	98	84	73	65
		3.0	1.200	180	144	120	103	90	80
		4.0	1.386	208	166	139	119	104	92
Red	FC-HESI-11004P (6 pack)	1.0	0.924	139	111	92	79	69	62
		2.0	1.306	196	157	131	112	98	87
		3.0	1.600	240	192	160	137	120	107
		4.0	1.848	277	222	185	158	139	123
Brown	FC-HESI-11005P (6 pack)	1.0	1.155	173	139	115	99	87	77
		2.0	1.633	245	196	163	140	122	109
		3.0	2.000	300	240	200	171	150	133
		4.0	2.309	346	277	231	198	173	154
Grey	FC-HESI-11006P (6 pack)	1.0	1.386	208	166	139	119	104	92
		2.0	1.960	294	235	196	168	147	131
		3.0	2.400	360	288	240	206	180	160
		4.0	2.771	416	333	277	238	208	185
White	FC-HESI-11008 (6 pack)	1.0	1.848	277	222	185	158	139	123
		2.0	2.613	392	314	261	224	196	174
		3.0	3.200	480	384	320	274	240	213
		4.0	3.695	554	443	370	317	277	246
Light Blue	FC-HESI-11010 (6 pack)	1.0	2.309	346	277	331	198	173	154
		2.0	3.266	490	392	327	280	245	218
		3.0	4.000	600	480	400	343	300	267
		4.0	4.619	693	554	462	396	346	308
Light Green	FC-HESI-11015 (6 pack)	1.0	3.464	520	416	346	297	260	231
		2.0	4.899	735	588	490	420	367	327
		3.0	6.000	900	720	600	514	450	400
		4.0	6.928	1039	831	693	594	520	462
Black	FC-HESI-11020P (6 pack)	1.0	4.620	690	550	460	400	350	310
		2.0	6.532	980	784	653	560	490	435
		3.0	8.000	1200	960	800	686	600	533
		4.0	9.238	1386	1109	924	792	693	616

NB: Application rates shown in this chart are based on tests at 3 bar, 50cm nozzle spacing and 50cm boom height. Flow rates are based on water, for liquids with different specific gravity use the calculation on page 52 to select nozzle size.

ORDERING: Use part numbers shown. For single nozzles, delete 'H' in part number, e.g. FC-ESI-110XX. Replacement seal part no. 65-BS205.



Hypro XT Nozzles for Boomless Spraying

For applications where it is not possible to use a conventional spray boom or to extend spraying width at the boom end. Throws a coarse, even spray pattern up to 4.9 metres. Ideal for use in where there are obstructions to spraying, such as forests or grassland. Available with threaded stainless steel body or with integral FastCap bayonet attachment (FC option for sizes 010 to 043).



	PART NUMBER	BAR	L/MIN	APPLICATION RATES L/HA AT KM/H												SPRAY WIDTH (M) @3 BAR	XT THREAD NPT
				4	5	6	7	8	10	12	14	16	18	20			
Green	FC-XT010 & FC-XT010	2	3.2	124	99	83	71	62	50	41	35	31	28	25	3.9	1/4"	
		3	3.9	152	121	101	87	76	61	51	43	38	34	30			
		4	4.6	175	140	117	100	88	70	58	50	44	39	35			
Blue	XT020 & FC-XT020	2	6.4	201	161	134	115	101	81	67	58	50	45	40	4.8	1/4"	
		3	7.9	247	197	165	141	123	99	82	71	62	55	49			
		4	9.1	265	228	190	163	142	114	95	81	71	63	57			
Yellow	XT024 & FC-XT024	2	7.7	237	189	158	135	118	95	79	68	59	53	47	4.9	1/4"	
		3	9.5	290	232	193	166	145	116	97	83	73	64	58			
		4	10.9	335	268	223	191	167	134	112	96	84	74	67			
Orange	XT043 & FC-XT043	2	13.9	473	378	315	270	236	189	158	135	118	105	95	4.4	3/8"	
		3	17.0	579	463	386	331	289	232	193	165	145	129	116			
		4	19.6	668	535	446	382	334	267	223	191	167	149	134			
Red	XT080	2	25.8	992	793	661	567	496	397	331	283	248	220	198	3.9	1/2"	
		3	31.6	1215	972	810	694	607	486	405	347	304	270	243			
		4	36.5	1403	1122	935	802	701	561	468	401	351	312	281			
White	XT167	2	53.8	1878	1502	1252	1073	939	751	626	537	469	417	376	4.3	3/4"	
		3	65.9	2300	1840	1533	1314	1150	920	767	657	575	511	460			
		4	76.1	2656	2125	1771	1518	1328	1062	885	759	664	590	531			
Grey	XT215	2	69.3	2122	1697	1414	1212	1061	849	707	606	530	471	424	4.9	3/4"	
		3	84.9	2598	2079	1732	1485	1299	1039	866	742	650	577	520			
		4	98.0	3000	2400	2000	1715	1500	1200	1000	857	750	667	600			

Application rates are based on the swath widths listed at boom height 1.2m.

Use the following calculation if using a different swath: To select the right nozzle flow rate:

$$l/min = \frac{l/ha \times km/hr \times swath\ width\ (m)}{600}$$

$$l/ha = \frac{l/min \times 600}{km/hr \times swath\ width\ (m)}$$

ORDERING - Use part numbers shown. (FC = Fastcap Option). Swivel holder available, part no: I5Q3570A. Giokit (pattern generator, flow insert and internal O-ring) for stainless steel nozzle is available, to order use part number followed by 'G' e.g. XT010G.

Flow rates are based on water, allowance must be made for liquids of different viscosity and specific gravity, (e.g. liquid fertiliser). For calculation see page 52. Swath width can be altered by adjusting nozzle angle by +/- 18°.



BAYONET CAPS

Simple twisting operation for easy installation and alignment of nozzles. Use with Hypro branded and other EF3 type nozzle bodies.



	Flat Fan; DB, GA, LD, VP, F, E		Cone; FCX, HCX, Disc & Core	
	No Seal	With Seal	No Seal	With Seal
Orange	15OR2606	CAP00-01	15OR2604	CAP04-01
Green	15RG2606	CAP00-015	15RG2604	CAP04-015
Yellow	15YE2606	CAP00-02	15YE2604	CAP04-02
Lilac	15LL2606	CAP00-025	15LL2604	CAP04-025
Blue	15UB2606	CAP00-03	15UB2604	CAP04-03
Brown Red	15RB2606	CAP00-035	-	-
Red	15RE2606	CAP00-04	15RE2604	CAP04-04
Brown	15LB2606	CAP00-05	15LB2604	CAP04-05
Grey	15GY2606	CAP00-06	15GR2604	CAP04-06
White	15WH2606	CAP00-08	15WH2604	CAP04-08
Light Blue	15CB2606	CAP00-10	15CB2604	CAP04-10
Light Green	15LG2606	CAP00-15	15LG2604	CAP04-15
Black	15BL2606	CAP00-20	15BL2604	CAP04-20

Seal part numbers: 22W11MF64 (EPDM), 22W11MF64V (Viton).

Cap Type	Part Number
Fastcap - DT (no offset) & seal (black)	CAP30-20
FastCap - Albus standard fan (black)	30Q2603-20
FastCap - Hardi (black)	16842490
Seal for Hardi cap	16842491
Twincap - Acetal	152607TC
Twincap - Acetal, one exit blanked	VPTCAP
Blanking insert for Twincap	30Q3834
Twincap - PDVF, acid resistant	15Q2530TC
Twincap - for Hardi bodies	16Q2530TC
Cap adaptor - Hardi bodies (10 pack)	9950-0024
Cap adaptor - Jacto bodies (10 pack)	9950-0027

TWIN CAP

Holds two flat fan nozzles that incline spray at 30°. Available in polyacetal, PVDF (acid resistant) and to fit Hardi nozzle bodies. One outlet can be blanked to make a single inclined spray.



CAP ADAPTORS

Allows Hypro bayonet caps to be fitted to Hardi or Jacto nozzle bodies, packs include 10 sealing washers.



Nozzle Holders, Nozzle Valves and Duo React

A choice of turret styles that can accommodate from 1 to 5 different nozzles on a holder. Multi-holders mean that nozzles can be changed over easily to quickly adapt to different spraying requirements, maintaining maximum flexibility.

All holders have a 10 mm spigot and are fitted with chemical saving diaphragm check valves (EPDM or Viton® seals) or a Prostop™ pneumatic or ProStop-E electric nozzle valve. Offered with 1/2, 3/4, 1 inch, 20 or 25mm clamp sizes.



3-WAY PROFLO NOZZLE BODY (HINGED CLAMP)

Diaphragm Options	Part Number – Diameter of Pipe				
	1/2"	3/4"	1"	20mm	25mm
EPDM (RED)	4223N-B322	4223N-B323	4223N-B324	4223N-B327	4223N-B328
VITON® (GREEN)	4223N-B322V	4223N-B323V	4223N-B324V	4223N-B327V	4223N-B3228V

To replace DCV with ProStop, add 'PS' to part numbers shown.



3-WAY PROFLO NOZZLE BODY (UDDER STYLE, EPDM DIAPHRAGM)

Clamp Type	Part Number – Diameter of Pipe		
	1/2"	3/4"	1"
HINGED	4222N-B322C	4222N-B323C	4222N-B324C
SPLIT	4222N-B322	4222N-B323	4222N-B324

To replace DCV with ProStop, add 'PS' to part numbers shown.



5-WAY PROFLO NOZZLE BODY (HINGED CLAMP)

Diaphragm Options	Part Number – Diameter of Pipe				
	1/2"	3/4"	1"	20mm	25mm
EPDM (RED)	4223N-B522	4223N-B523	4223N-B524	4223N-B527	4223N-B528
VITON® (GREEN)	4223N-B522V	4223N-B523V	4223N-B524V	4223N-B527V	4223N-B5228V

To replace DCV with ProStop™, add 'PS' to part numbers shown.



SINGLE PROFLO NOZZLE BODY (HINGED CLAMP)

Diaphragm Options	Part Number – Diameter of Pipe				
	1/2"	3/4"	1"	20mm	25mm
EPDM (RED)	4221N-B122	4221N-B123	4221N-B124	4221N-B127	4221N-B128
VITON® (GREEN)	4221N-B122V	4221N-B123V	4221N-B124V	4221N-B127V	4221N-B128V

To replace DCV with ProStop, add 'PS' to part numbers shown.



NOZZLE CONTROL VALVES

Either air or electrically actuated to rapidly open and close to control flow to the nozzle. ProFlo nozzle holders can be ordered pre-fitted with a control valve in place of a DCV.

Actuation	Description	Part Number
PNEUMATIC	PROSTOP	PS3/4F-PN
ELECTRIC	PROSTOP-E	3305-0011



DUO REACT - TWIN VALVE NOZZLE BODY

A pneumatic or electro-pneumatically actuated nozzle body that allows the user to select nozzles from the cab. Combines a single and a 4-way holder with twin valves so that they can be operated either singly or together. One electro-pneumatic Duo React nozzle body can be used as a section valve to control up to 7 pneumatic slave bodies.

Actuation	Part Number – Diameter of Pipe				
	1/2"	3/4"	1"	20mm	25mm
PNEUMATIC	4214-1502V	4214-1503V	4214-1504V	4214-1507V	4214-1508V
ELECTRO-PNEU	4214-2502V	4214-2503V	4214-2504V	4214-2507V	4214-2508V

Nozzle Filters

Precision-made in durable polypropylene or stainless steel mesh. Made in ISO 19732-2007 standard colours. For filter size recommendations see table on page 47.

POLYPROPYLENE UNIVERSAL FILTERS

Part Number	Type	Mesh
TS01-50	Medium	50
TS01-100	Fine	100



POLYPROPYLENE FILTERS (FOR GAT NOZZLES)

Part Number	Type	Mesh
TS02-50	Medium	50
TS02-100	Fine	100



STAINLESS STEEL MESH CUP FILTERS

Part Number	Type	Mesh
3250A245	Medium	50
3210A245	Fine	100



POLYPROPYLENE CUP FILTERS

Part Number	Type	Mesh
3210063P	Coarse	30
3210065P	Medium	50



STAINLESS STEEL MESH FILTERS

Part Number	Type	Mesh
32100050	Medium	50
32100010	Fine	100



Also available with ball check valve

PROCLEAN ROTATING NOZZLES

360 degree cleaning. Reaches all container internal surfaces including neck for fast cleaning with minimum water usage.

PART NO: PC1/2F-36075



PROCLEAN TANK WASH NOZZLE

Rotating tank wash nozzle designed to be mounted downwards. Directs spray to top and sides of tank.

PART NO: PC1/2F-235120



PROCLEAN PLUS NOZZLE

A powerful single jet designed to clean the sediment at the base of containers. Use alongside the Pro-Clean rotating nozzle.

PART NO: 30B4SNF70E35



STATIC TANK WASH NOZZLE:

Multi jet fixed spray pattern.

PART NO: 01TWQ2424



PROCLEAN VALVE

Either ProClean container wash nozzle screws on top. Press the container rim onto the valve to release cleaning jet.

PART NO: PV1/2F1/2M-MA



JET AGITATORS

Ensure good mixing and suspension of chemicals in the sprayer tank. Induction ratios of up to 5 to 1.

PART NO: A1A5HE3371



CLEANLOAD

Self contained induction unit featuring 26.5 litre hopper, Hypro venturi eductor and Proclean rotating nozzle.

PART NO: 3376-1170



HYPRO VENTURI EDUCTOR

3 high flow options up to 90, 160 or 300 l/min. 2 inch universal flange ports and 1/2" push-fit for hopper rinse.

PART NO: 3371-0038R



Valves & Controls

BALL VALVES - MANUAL AND ELECTRIC

Robust and reliable 2, 3, 4 and 5 way ball valves that ensure spray liquid flows smoothly for minimal pressure loss. Glass reinforced polypropylene with bottom or side connection and a choice of threaded and flanged fittings.



CUSTOMISED CONTROL UNITS

Modular control units incorporating volumetric regulating valves, adjustable pressure relief valves, flowmeters and line filters with choice of inlet and bypass diameters. Control panels are also available to suit a wide variety of boom section combinations.



PADDLE FLOWMETERS

Digiwolf paddle flowmeters; low friction and high accuracy featuring programmable graphic display allowing threshold min/max alarm. Connect with fork couplings in 1 1/4", 1 1/2" and 2". Powered by 12 vdc or 2x AA batteries with auto switch-off.

Coupling	Power Option	Part Number
2" forked	12v dc	4627707A
2" forked	2 x AA battery	464628707



ELECTROMAGNETIC FLOWMETERS

Orion flowmeters measure the volume flow of electrically conductive liquids using a magnetic field. Accurate, robust and reliable, results can be displayed on the unit itself or output to a screen. Accurate to 0.5%, performance is not affected by fluid density or viscosity. Flange or threaded fittings in 3/4" to 2".

Thread	With Display	Without Display
1 1/2" nylon	464622BA51616	64622AA51616
2" nylon	464622BA61717	464622AA61717



FOOT FILTERS

First or preliminary stage of filtration. The coarse mesh prevents very large particles or debris from being drawn into the tank. 1", 1 1/4", 1 1/2" and 2" threads. 16 mesh filter element.

Thread	Part Number
1 1/4"	0800A613
2"	0800A615

SUCTION FILTERS

Second stage filtration, removing larger particles. Offer protection for the pump and spray components. Available with 1 1/4", 1 1/2", 2" & 3" male ports. 30 and 50 mesh filter elements.



PRESSURE LINE FILTERS

Provide third stage filtration. Positioned between pump and spray lines they remove fine particles, preventing nozzle blockage and excessive wear. Available with 1/2", 3/4", 1", 1 1/4" and 1 1/2" female ports. 30, 50, 80 and 250 mesh filter elements.

ROW MARKERS

A bolt-on system includes blobber unit, compressor and all necessary pipework to suit a 24m sprayer.

PART NO: 52520005



Pipes & Fittings

A comprehensive range of pipes and fittings supplied either individually or as sub-assemblies to an agreed specification. Specific o-rings are available for many threaded fittings, eliminating the need to use PTFE tape.

POLYPROPYLENE, NYLON AND PVC FITTINGS

Wide variety of fittings from 1/2" to 2 1/2". Consider operating pressure, chemical, stress and impact resistance when specifying the material for your fittings.



QUICK RELEASE COUPLINGS

Wide variety of cam lever couplings from 1/2" to 3", manufactured in glass reinforced polypropylene for strength and resistance. Stainless Steel also available.



NON-THREADED FITTINGS

Universal flange, hose barb, and camlock boom-end connections, as well as venting nozzle body end caps. Eliminate threads and welds for simple fitting, leak free and perfectly aligned assembly. Manufactured in polypropylene.



PUSH TO CONNECT NOZZLE BODIES AND CAPS

Allows flexible positioning and easy adjustment of nozzle body position when spraying from non-standard booms.



PVC PIPE

Heavy duty, pressure rated up to 20 bar, 1/2" to 2" nominal bore, can be supplied pre-drilled, for convenient on-site fabrication.

HOSE

Options of 3/4" to 3" reinforced rubber hose for pressure applications and 1" to 3" Heliflex hose ideal for suction applications.

PRO-FIT FLANGE FITTINGS

Provide secure and repeatable fitting without threads or welding. Ideal for connecting Hypro pump models and Cleanload with universal flange ports. Manufactured from glass reinforced polypropylene for strength and durability. Available in 1", 2" and 3" in a wide range of configurations, some of which are shown below. Connect with **NEW** Hypro Universal Flange Clamps for even clamping pressure and durability.

	Part Number	Fitting Type
	UF200	2" Flange x 2" Flange
	UF300	3" Flange x 3" Flange
	UF100L	1" Elbow Flange x 1" Flange
	UF200L	2" Elbow Flange x 2" Flange
	UF300L	3" Elbow Flange x 3" Flange
	UF100L - HB150	1" Elbow Flange x 1 1/2" Hose barb
	UF200L - HB200	2" Elbow Flange x 2" Hose barb
	UF300L - HB300	3" Elbow Flange x 3" Hose barb
	UF100 - HB150	1" Flange x 1 1/2" Hose barb
	UF200 - HB200	2" Flange x 2" Hose barb
	UF300 - HB300	3" Flange x 3" Hose barb
	UF100 - MN100	1" Flange x 1" NPT male coupler
	UF200 - MN200	2" Flange x 2" NPT male coupler
	UF300 - MN300	3" Flange x 3" NPT male coupler
	UF200T	2" Tee flange
	UF300T	3" Tee flange
	BG-UF0100E-A-S	1" Universal flange clamp and gasket
	BG-UF0200E-A-S	2" Universal flange clamp and gasket
	BG-UF0300E-A-S	3" Universal flange clamp and gasket

Testing & Monitoring Equipment

150MM MASTER PRESSURE GAUGE

0-10 bar with 0.1 bar graduations. Accurate to $\pm 1\%$ for comparative testing of boom pressure gauges in conjunction with multi-port adaptor.

PART NO: 366010100



MULTI-PORT PRESSURE GAUGE TESTING ADAPTOR

Designed to test the accuracy of a pressure gauge. Multi-ported to accommodate different gauge types.

PART NO: 360Q3166



SPRAYER TESTING KITS

A robust case containing a master pressure gauge and a multi-port adapter. Also contains a nozzle pressure testing kit (PART NO: 363Q3168), which can be used to check the pressure at the nozzle and a 1L measuring cylinder.

PART NOS:

01TESTCASE-EF3 (For EF3 nozzle bodies)

01TESTCASE-HARD (for Hardi nozzle bodies)



REDBALL INSTANT CALIBRATOR

Gives an instant, accurate flow rate reading in litres per minute. Hand held, no tools required.

PART NO: 01-1C310

CENTRIFUGAL PUMPS

- Rotate at high speed to create centrifugal force.
- Low maintenance requirement and simple operation.
- Self-priming options available.
- Simple plumbing and operation.

- Suitable for high volume chemical application and liquid transfer.
- Ideal for self-propelled sprayers.



ROLLER PUMPS

- Positive displacement pumps.
- Rotates to create uniform spray output.
- Self-priming.
- Easily maintained with few moving parts.

- Can be connected directly to PTO.
- Ideal for lower output small and medium sprayers.
- Can be used as additional pump for high pressure rinsing or chemical dilution.



PISTON PUMPS

- Positive displacement pumps.
- Relatively low flow (up to 40 l/min) and higher pressure (up to 69 bar).
- Self-priming.
- Can be connected directly to PTO.

- Ideal for stationary sprayers, misting and cooling systems.



SHURFLO DIAPHRAGM PUMPS

- Use a flexible diaphragm to capture and discharge a fixed volume of fluid.
- Self-priming.
- Smooth and consistent flow up to 23 l/min. Pressure up to 10 bar.

- 12v, 24v or 230v mains electrical motors suitable for continuous or intermittent operation.
- Ideal for smaller sprayers, mini bulk transfer and fluid circulation application.



Hypro Centrifugal Pumps

A centrifugal pump uses a rotating impeller to create a centrifugal force that feeds liquid through the system. Hypro's centrifugal pumps can deliver from 0-13 bar and flow rates up to 3400 l/min making them ideal for wide booms and faster speeds as well as continuous transfer applications.



Centrifugals are simple in design with no valves, they are durable, easy to maintain and suitable for pumping abrasive and corrosive materials. Plumbing is straightforward with no need for a relief valve, bypass or suction filter, however care should be given to the mounting location of the pump and complexity of plumbing. Choose from hydraulic motor, pedestal and PTO, drives, as well as models closed-coupled to petrol engines. Mechanical seal options include standard Viton®/Ceramic, longer life Life Guard® silicon carbide (SiC) or the Forcefield™ wet seal capable of tolerating up to 15 minutes of run dry. Self-priming options or use with Hypro's separate Self-Priming Adaptor (PART NO: 1530-0025S).

9307C WITH OPTIONAL FORCEFIELD SEAL

A robust pump ideal for heavy duty use. Features cast iron case, 316 stainless steel impeller, toughened shaft and bearings and hydraulically driven internal gear motor with case-drain. Optional new wet Forcefield seal virtually eliminates the risk of seal damage during typical 'run-dry' situations such as forgetting to shut off the sprayer pump between fields.



Model	Max. flow (l/min)	Max. pressure (bar)	Hyd. motor (l/min)	Seat	Inlet / Outlet
9307C-GM12	1400	9.3	87	Life Guard (SiC)	3"/2" NPT
9307C-GM12-U	1400	9.3	87	Life Guard (SiC)	3"/2" flange
9307CWS-GM12	1400	9.3	87	Forcefield	3"/2" flange

9047C CENTRIFUGAL PUMPS - PTO DRIVE

For connection directly to a 540 rpm PTO drive. Capable of up to 800 l/min and pressure up to 12.4 bar. Cast iron with a glass filled nylon impeller. 2" inlet and 1½" BSP or NPT outlets. Fitted with Life Guard (SiC) seal for dry run protection as standard. Self-priming option available (-SP).



Model	Max. flow (l/min)	Max. pressure (bar)	Hyd. motor (l/min)	Inlet / Outlet
9047C	806	12.4	540	2" / 1½" NPT
9047C-SP	738	11.7	540	2" / 1½" NPT

For BSP thread add '-BSP'.

9303 SERIES CENTRIFUGAL PUMPS - HYDRAULIC DRIVE

Available in Cast iron and 316 Stainless steel for superior chemical corrosion resistance. Flow up to 550 LPM and pressure up to 13 bar. Cast iron models have nylon turbine and Viton®/Ceramic seal as standard. Stainless steel models have polypropylene turbine and Life Guard (SiC) carbide seats.



Model	Max. flow (l/min)	Max. pressure (bar)	Hyd. motor (l/min)	Inlet / Outlet
9303X-HM1C	432	9.0	49	1½" / 1¼" NPT or 2"/1½" flange*
9303X-HM2C	367	6.5	23	1½" / 1¼" NPT or 2"/1½" flange*
9303X-HM3C	473	6.8	90	1½" / 1¼" NPT or 2"/1½" flange*
9303X-HM4C	435	6.4	26	1½" / 1¼" NPT or 2"/1½" flange*
9303X-HM5C	556	10	60	1½" / 1¼" NPT or 2"/1½" flange*

For Cast Iron replace X with 'C', for 316 stainless steel replace X with 'S'.

For self-priming version add "-SP".

For Life Guard (SiC) seal add suffix "-B".

* For 2"/1½" universal flange add suffix "-U".

3430-0332 - Viton/Ceramic seal and o-ring repair kit.

3430-0589 - Life Guard (SiC) seal repair kit.

For full details of Centrifugal and Transfer Pump ranges and options, see current Hypro catalogue.

Hypro Centrifugal Pumps

9305C CENTRIFUGAL PUMPS - HYDRAULIC DRIVE

Flow up to 540 l/min and pressures up to 9.5 bar. Available in cast iron with Viton®/Ceramic or Life Guard (SiC) seals and a nylon impeller. Self-priming option available (-SP).



Model	Max. flow (l/min)	Max. pressure (bar)	Hyd. motor (l/min)	Inlet / Outlet
9305C-HM3C	689	10.7	72	2" NPT or BSP
9305C-HM3C-SP	674	10.6	72	2" NPT or BSP

For the Life Guard (SiC) seal add suffix "-B". For BSP thread, add 'BSP'.

9306 SERIES CENTRIFUGAL PUMPS - HYDRAULIC DRIVE

The 9306 series offers exceptional performance for a relatively small (301x237x230 mm) and lightweight (12 kg) pump. Flow up to 1200 l/min and pressures of 9.5 bar. Cast Iron models have nylon turbine and Viton®/Ceramic seal. Stainless steel models have polypropylene turbine and Life Guard (SiC) seals.



Model	Max. flow (l/min)	Max. pressure (bar)	Hyd. motor (l/min)	Inlet / Outlet
9306X-HM1C	783	9	50	2" / 1½" NPT or 2" / 2" flange*
9306X-HM3C	810	9.3	90	2" / 1½" NPT or 2" / 2" flange*
9306X-HM5C	803	9.6	64	2" / 1½" NPT or 2" / 2" flange*
9303X-HM1C-3U	1071	9	50	3" / 2" flange
9303X-HM3C-3U	1219	9.3	90	3" / 2" flange
9303X-HM5C-3U	1181	9.6	64	3" / 2" flange

For Cast iron replace X with 'C', for 316 stainless steel replace X with 'S'.

For Life Guard (SiC) seal add suffix "-B".

3430-0332 - Viton®/Ceramic seal and o-ring repair kit.

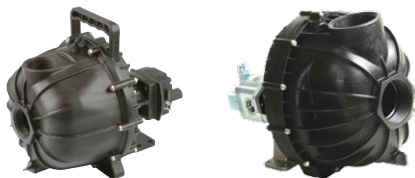
3430-0589 - Life Guard (SiC) seal repair kit.

* For 2"/2" universal flange add '-U' to part number.

For full details of Centrifugal and Transfer Pump ranges and options, see current Hypro catalogue.

Hypro Transfer Pumps are ideal for tank filling, high capacity liquid transfer irrigation and flood water removal. Offering flow rates up to 1650 l/min and up to 4 bar. Resistant polypropylene casing suitable for use with agrochemicals. Self-priming when pre-filled with water. Maximum suction height of 5 metres. Impellers made from either nylon or polypropylene with Stainless Steel inserts, allowing you to work with fluids containing solid particles up to 0.95 cm in diameter.

HYDRAULIC MOTOR DRIVEN TRANSFER PUMPS



Model	Max. flow (l/min)	Max. pressure (bar)	Hyd. motor (l/min)	Inlet / Outlet
9342P-HM1C-5SP	757	4	38	2"
9342P-HM5C-5SP	780	4	42	2"
9343P-GM6Y-SP	1545	4	40	3"
9343P-GM10Y-SP	1650	3.5	60	3"

Y denotes case drain version.
3430-0635 - EPDM Seal Kit.

PETROL AND ELECTRIC TRANSFER PUMPS



Model	Max. flow (l/min)	Max. pressure (bar)	Motor type	Inlet / Outlet
1442P-65SP	757	4.0	6.5 HP	2" / 2" NPT
9742P-050SPT	454	2.2	Single phase 50 Hz	2" / 2" NPT
9742P-050SPT3	454	2.2	3 phase 50 Hz	2" / 2" NPT
9742P-075SPT3	606	2.6	3 phase 50 Hz	2" / 2" NPT

For full details of Centrifugal and Transfer Pump ranges and options, see current Hypro catalogue.

Hydro Roller Pumps

4 or 8 revolving rollers create smooth flows up to 280 l/min and up to 20 bar, suitable for smaller sprayers or as an additional pump for higher pressure rinsing or chemical dilution. Roller pumps are self-priming and easily located on the sprayer and, with few moving parts, they are easily maintained. Hydraulic, PTO, petrol or electric drives are available. Casing, roller and seal materials can be specified according to the chemical compatibility required.



SERIES 1200

Model	Max. LPM	Max. BAR	Max. RPM	Connection	Solid Shaft
1200C	280	10	800	1½" NPT	1"



SERIES 1502

Model	Max. LPM	Max. BAR	Max. RPM	Connection	Solid Shaft
1502C	235	10	1000	1½" NPT	1 ⁵ / ₁₆ "
1502N	235	10	1000	1½" NPT	1 ⁵ / ₁₆ "
1502XL	235	10	1000	1½" NPT	1 ⁵ / ₁₆ "



SERIES 1700

Model	Max. LPM	Max. BAR	Max. RPM	Connection	Solid Shaft
1700C	170	13.8	1000	1" NPT	1 ⁵ / ₁₆ "
1700N	170	13.8	1000	1" NPT	1 ⁵ / ₁₆ "
1700XL	170	13.8	1000	1" NPT	1 ⁵ / ₁₆ "



SERIES 7560

Model	Max. LPM	Max. BAR	Max. RPM	Connection	Solid Shaft
7560C	85	20	1200	¾" NPT	1 ⁵ / ₁₆ "
7560N	85	20	1200	¾" NPT	1 ⁵ / ₁₆ "
7560XL	85	20	1200	¾" NPT	1 ⁵ / ₁₆ "



SERIES 7700

Model	Max. LPM	Max. BAR	Max. RPM	Connection	Solid Shaft
7700C	85	13.8	800	¾" NPT	1 ⁵ / ₁₆ "
7700N	85	13.8	800	¾" NPT	1 ⁵ / ₁₆ "
7700XL	85	13.8	800	¾" NPT	1 ⁵ / ₁₆ "



SERIES 6500

Model	Max. LPM	Max. BAR	Max. RPM	Connection	Solid Shaft
6500C	82	20	1200	¾" NPT	5/8"
6500N	82	20	1200	¾" NPT	5/8"

Teflon rollers - add suffix "T2", Polypropylene rollers - add suffix "T3".
 Buna-N seals - add suffix "M", Viton® seals - add suffix "Q", Reverse Rotation: add suffix "R".

Shurflo 12/24v Diaphragm Pumps

Shurflo diaphragm pumps use a flexible diaphragm to capture and discharge a fixed volume on each stroke with smooth, consistent flow up to 23.5 l/min and pressure up to 10 bar. Standard features include heavy duty 12v, 24v or 230v electrical motors suitable for continuous as well as intermittent operation.

Shurflo pumps are self-priming and able to deal effectively with a range of demand situations. Valves and diaphragms of different material can be specified according to the chemical compatibility required. Ideal for smaller sprayers, mini bulk transfer and fluid circulation applications.



Model	Pressure (Bar)	Flow (l/min)	Amps	Port Size	Power
8000-543-210	0.7	4.8	3.8	3/8" NPT	12 Volt
	1.4	4.5	4.4		
	2.1	4.0	5.0		
	2.8	0.19	5.5		



Model	Pressure (Bar)	Flow (l/min)	Amps	Port Size	Power
2087-593-135	0.7	10.6	5.3	1/2" NPT	12 Volt
	1.4	10.2	5.5		
	2.1	8.9	6.7		
	2.8	7.8	7.7		
	3.4	5.4	8.0		



Model	Pressure (Bar)	Flow (l/min)	Amps	Port Size	Power
2088-474-144	0.7	10.6	2.41	1/2" NPT	24 Volt
	1.4	8.5	2.63		
	2.1	6.6	2.73		
	2.8	4.7	2.71		



Model	Pressure (Bar)	Flow (l/min)	Amps	Port Size	Power
4111-035	0	23.5	8.7	1/2" NPT	12 Volt
	0.7	21.6	12.2		
	1.4	19.0	14.5		
	2.1	16.2	16.1		
	2.8	13.2	17.2		



Model	Pressure (Bar)	Flow (l/min)	Amps	Port Size	Power
5059-1311-D011	4.1	20	17	1/2" NPT	12 Volt

Many options available including 230v, see www.shurflo.com.

Knapsack and Hand Held Sprayers

VERMOREL COMFORT PRO SPRAYERS

Adjustable padded straps and an ergonomic frame make the Vermorel range ideal for the professional operator. Choose the manual version that requires approximately 10 strokes/min or the **NEW** Li-ion battery powered option.



COSMOS 18 SPRAYER

High performance pump, 60 cm lance, easily changeable nozzle and liquid level indicator. A lower cost option.



ELYTE COMPRESSION SPRAYERS

Ideal for smaller area spraying. Viton® seals allow use of more demanding spray materials such as disinfectants.

Other sprayer models and spraying accessories are available including; lances and extensions up to 3.6 m reach, spray booms, spray shields and pressure regulating valves.

For full details see www.knapsacksprayers.co.uk.

Part Number	Models description	Capacity
18102022	Vermorel 2000*	16 litre
18102088	Vermorel 1800	16 litre
18102140	Vermorel 3000 Electric	18 litre
18102216	Cosmos 18	18 litre
18101005	Elyte 14	8 litre
18101003	Elyte 6	6 litre

* 2000 model includes pressure relief valve, telescopic lance & nozzle pack

NOZZLES FOR KNAPSACK AND HAND HELD SPRAYERS



POLIJET (AN) AND DEFLECTIP (DT) ANVIL 55-130°

Different spray angles offer a choice of spray widths. Blockage resistant design (see page 26).



FULL CONE (FCX) 80°

Full pattern for spot treatment of weeds.



HOLLOW CONE (HCX) OR DISC & CORE

Fine droplets for spraying insecticides and fungicides (see page 25).



EVENSPRAY 80°

Distributes a medium fine spray evenly across the swath. Ideal for all targets (see page 24).



Kit containing Hollow Cone, Full Cone, Polijet and a 100 mesh green cup filter, PART NO. 30HKNAP. For filter information see page 32.

Problem	Cause	Corrective Action
Frequent nozzle blockage.	Screen too coarse.	Fit finer filter screen.
Pump will not suck.	Suction filter blocked.	Clean filter screen.
Pressure gauge fluctuates, nozzles splutter.	Air in line/pump sucking air.	Check suction lines for air leaks.
Output falls across one boom section.	Pressure line filter blocked.	Clean filter screen.
Main gauge pressure falling.	Suction and/or flushing filters blocked.	Clean and/or flush filters.

NB. It is possible to “screen off” certain chemicals if filtration is too fine.
Always check chemical label for specific advice on filtration.

SOME RECOMMENDED FILTERS FOR DIFFERENT FLOW RATES

Approximate Flow Rate Per Spray Nozzle	Typical Spray Nozzle Example		Nozzle Filter	Small Pressure Line Filter Element	Large Pressure Line Filter Or Flushing Filter Element	Suction Filter Element
1.2 L/min or less	01	015	100#/Green	80#/Yellow	80#/Yellow	50#/Blue
	02	03				
1.2 to 3.2 L/min	04	05	50#/Blue	50#/Blue	50#/Blue	30#/Red
	06	08				
3.2 L/min or more	10		30#/Red	30#/Red	30#/Red	30#/Red
	15	20				

Filter colour coding is based on ISO 19732:2007.
For Hypro filters, see pages 32 and 35.

Troubleshooting: General Spraying

Symptom	Problem
	<p>Excess chemical left in tank after spraying.</p> <p>Insufficient chemical applied resulting in poor agrochemical performance.</p>
	<p>Insufficient chemical in tank to complete spraying.</p> <p>Too much chemical applied therefore likelihood damage to crop.</p>
	<p>Poor distribution across boom.</p> <p>Strips that are untreated after spraying or strips showing damage to crop.</p>
	<p>Visible cloud behind sprayer during operation or damage to neighbouring crops.</p>
	<p>Excessive weed, pest, disease infestation and poor crop growth.</p>

Cause (s)	Corrective Action
Pressure gauge or regulator inaccurate.	Test, recalibrate and replace if necessary.
Restrictions in pipes and/or hoses.	Check pressure at nozzle and note difference with main gauge. Fit larger or better routed pipe and/or hoses.
Blocked nozzles or filters.	Clean and calibrate nozzles (see page 7). Clean all filters.
Worn or damaged nozzles.	Check and replace nozzles.
Pressure gauge or regulator inaccurate.	Test, recalibrate and replace if necessary.
Worn or damaged nozzles.	Check and replace nozzles.
DCV or nozzle valve damaged or worn preventing nozzle shut-off.	Check nozzle shut -off and replace or service DCV or nozzle valve if necessary.
Blocked nozzles or filters.	Clean and calibrate nozzles (see page 7). Clean nozzle filters.
Worn or damaged nozzles.	Check and replace nozzles.
Boom height incorrect or excessive boom bounce.	Check boom height relative to spray angle of nozzles, (see page 5). Reduce speed and review nozzle choice.
Spraying pressure too high.	Reduce spraying pressure to recommended level.
Pressure gauge inaccurate.	Replace gauge.
Too windy for spraying.	Discontinue until wind drops to acceptable level (see page 4).
Wrong choice of nozzles or pressure.	Consider using drift reducing nozzles or reducing pressure.
Wrong choice of nozzles or pressure.	Consult chemical label and Hypro for best nozzle choice.
Worn or damaged nozzle.	Check and replace nozzles as appropriate.
Incorrect boom height.	Check and adjust (see page 5).
Poorly maintained sprayer.	Have sprayer checked by an AEA approved sprayer test station.
Not related to application.	Your agronomist or chemical distributor for advice.

Troubleshooting: Centrifugal Pumps (Hydraulic Motor)

In case of problems, first consider if the most appropriate pump has been selected and is correctly plumbed into the hydraulic system. If performance is not satisfactory, check the following guide for possible problems and solutions.



Problem: Low Fluid Discharge	Corrective Action*
a. Pump not primed.	Remove topmost vent plug from face of pump and run pump to expel trapped air.
b. Air leaks in inlet line.	Check and reseal inlet fittings.
c. Blocked or clogged line filter.	Inspect filter and clear any debris from screen.
d. Undersize inlet line or collapsed hose.	Suction line should be the same diameter as inlet port of pump or larger.
e. Incorrectly sized hydraulic motor.	Select correct size motor for your hydraulic system.
f. Eye of impeller rubbing on volute.	Remove volute (front cover) and inspect the impeller. If wear detected, sand the impeller eye O.D. with emery cloth.
Problem: Hydraulic System Overheating	Corrective Action*
a. Incorrectly sized hydraulic motor.	Select correct size motor for your hydraulic system.
b. Insufficient hydraulic hose size.	Check hydraulic hose size. Hose should be at least 1/2" or 3/4" for large open centre systems.
c. Bypass Adjustment Screw set to bypass too much oil.	Close adjustment screw on side of hydraulic motor to lessen the amount of oil being bypassed.
d. Incorrect metering orifice installed in pressure port.	Refer to installation manual for correct sizing.

* Always refer to pump installation manual before working on a pump (manuals can be found at www.hypropumps.com).

Troubleshooting: Diaphragm Pumps

In case of problems, first consider if the most appropriate pump has been selected and is correctly plumbed into the hydraulic system. If performance is not satisfactory, check the following guide for possible problems and solutions.



Problem: Pump Does Not Suck	Corrective Action*
a. Suction filter blocked.	Clean filter.
b. Diaphragm pump - valves damaged or not seating.	Check valves and clean seats.
c. Restriction in suction line.	Rectify restriction.
d. Air entering pump inlet.	Check for leaks in the hose and pipework on the suction side of the pump. Once resolved, with one or more boom sections open, run pump for 1 or 2 minutes at zero pressure, to evacuate all air.
Problem: Gauge Needle Fluctuates & Nozzles Spit Air	Corrective Action*
Pump not evacuated of air or sucking air.	Check for leaks in the hose and pipework on the suction side of the pump. Once resolved, with one or more boom sections open, run pump for 1 or 2 minutes at zero pressure, to evacuate all air.
Problem: Pump & Gauge Needle Pulsate	Corrective Action*
Incorrect pressure in air receiver.	Pressurise air receiver to between 25 and 33% of operating pressure.
Problem: Loss Of Pump Pressure	Corrective Action*
a. Pressure regulator faulty or lacking capacity.	Repair or replace pressure regulator.
b. Pump capacity insufficient for nozzles fitted.	Change nozzles and / or spraying speed.
c. Diaphragm / valves damaged.	Check and replace.
d. Flow restricted.	Check all filters and lines.

* Always refer to pump installation manual before working on a pump.

NOZZLE OUTPUT FOR OVERALL SPRAYING

$$\text{Litres/min per nozzle} = \frac{\text{L/Ha} \times \text{km/hr} \times \text{nozzle spacing (m)}}{600}$$

NOZZLE OUTPUT FOR BAND SPRAYING

$$\text{Litres/min per nozzle} = \frac{\text{L/Ha} \times \text{km/hr} \times \text{band width (m)}}{600}$$

CORRECTION FOR SPECIFIC GRAVITY OF SPRAYED LIQUID

Application rates shown in nozzle charts are based upon tests with plain water at 3 bar, 50 cm nozzle spacing. Liquids with a higher Specific Gravity (S.G.) than water (e.g. liquid fertiliser) flow more slowly, so a Correction Factor needs to be calculated to ensure correct nozzle selection:

$$\text{Correction Factor} = \sqrt{\frac{1}{\text{S.G.}}}$$

Use the Correction Factor to calculate a Reference Application Rate:

$$\text{Reference Application Rate l/ha} = \frac{\text{Target Application Rate in L/Ha}}{\text{Correction factor}}$$

Use this Reference Application Rate to select nozzle size, pressure and speed from the nozzle charts on pages 14-28. These settings will then apply the **Target Application Rate**.

Example: When aiming to supply 240 l/ha of spray liquid with a specific gravity of 1:28 the correction factor calculates to 0.88:

$$\frac{240 \text{ l/ha}}{0.88} = 273 \text{ (use this figure to select the nozzle, and it will apply 240 l/ha)}$$

USEFUL CONVERSIONS

	MULTIPLY BY	TO OBTAIN
Centimetres (cm)	x 0.3937	inches
Metres (m)	x 3.281	feet
Kilometres (km)	x 0.6214	miles
Hectares (Ha)	x 2.471	acres
Millilitres (ml)	x 0.035	fluid ounces
Litres (l)	x 0.22	Imperial gallons
Litres (l)	x 0.264	US Gallons
Bar	x 14.5	psi

To convert litres/hectare to gallons/acre divide by 11.3 (imperial)



HYPRO® NOZZLES

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TECHNOLOGY ON TARGET



DUO REACT TWIN VALVE NOZZLE BODY

Precision spraying starts by choosing the right nozzle. Duo React is a simple, compact and inexpensive way to switch nozzles from the cab.



HYPRO® NOZZLES

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