

# PBL® Universal Split Flow Dart System



The Universal Split Flow Dart System was developed on the back of the PBL® original Split Flow Dart System that has been available to our clients for several years.

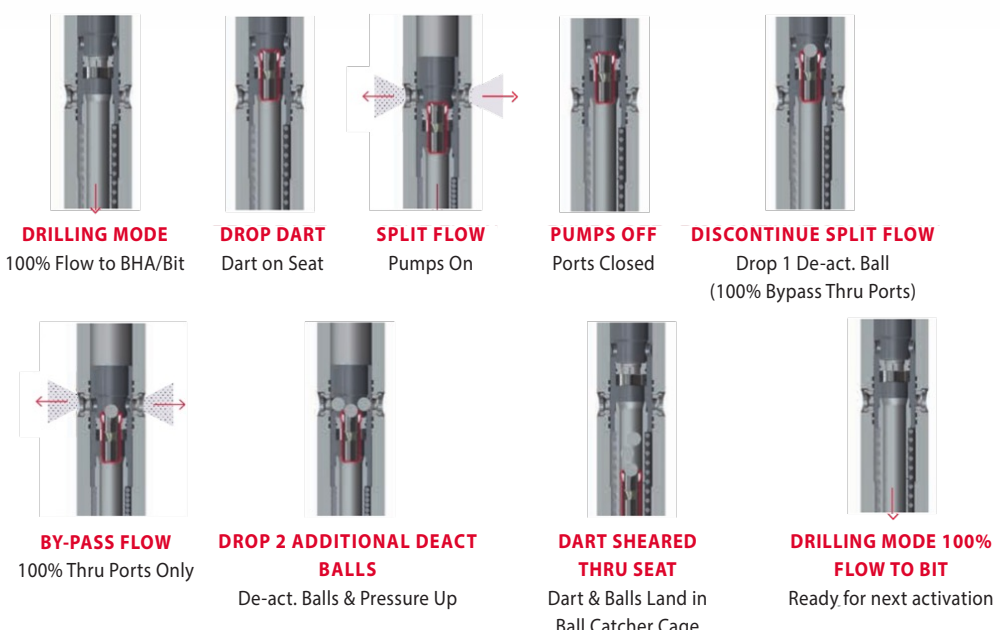
The Split Flow Dart System was originally developed to allow a pre-calculated amount of drilling or completion fluid to pass through the PBL® Bypass System and onto the BHA below, and the remaining fluid to be bypassed out of the PBL® Bypass System ports. By splitting the flow, the operator was able to have more control over available hydraulics and hole cleaning parameters.

The next-generation Universal Split Flow Dart System helps Operators achieve almost all the benefits of the original Split Flow Dart System as well as the ability to switch to 100% bypass. This allows aggressive LCM to be pumped, without the need to deactivate the tool or trip out to change the tool.



## FEATURES AND BENEFITS

- Pre-calculated percentage of the drilling or completion fluid can pass through the PBL® and onto the BHA below, and the remaining fluid to be bypassed out the PBL® ports
- Flow ratios are predetermined by nozzle sizes that are pre-installed in the dart and the port inserts (as shown in the technical specification table).
- Split flow can be discontinued by dropping one steel ball to give 100% flow to the annulus
- Dart can be deactivated by dropping a further two steel balls to give 100% flow to the BHA
- PBL® can also be activated via standard ball drop, if required
- Multiple Cycles (number of cycles are determined by length of the catcher cage and sub)
- All nozzles are field-changeable hence the Universal Split Flow Dart System can be converted to a standard Split Flow Dart System by installing the appropriate nozzles in the dart and the port inserts once the nozzle sizes are determined by our in-house hydraulics program to achieve the desired flow ratio.
- Allow a limited amount of fluid to cool BHA while circulating



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# Technical Specifications

Tool Size (in.)	9 ½ & 8 ¼			6 ¾			4 ¾	
<b>Total Flow (GPM)</b>	1200 +	1200 +	<1200	600 +	600 +	<600	400 +	350 +
<b>Port Nozzles (in.)</b>	36/32	N/A	N/A	30/32	N/A	N/A	24/32	N/A
<b>Port Type</b>	Reduced dia	Autolock	Autolock	Reduced dia	Autolock	Autolock	Reduced dia	Autolock
<b>Port Diameter (in.)</b>	1.12	1.35	1.35	0.93	1.1	1.1	0.75	1.1
<b>TFA (in²)</b>	0.98	1.43	1.43	0.68	0.95	0.95	0.442	0.95
<b>EHD (in.)</b>		2.42			1.93		1.46	
<b>Total Port TFA (in²)</b>	1.96	2.863	2.863	1.36	1.901	1.901	0.884	1.901
<b>Dart Nozzle (in.)</b>	32/32	32/32	24/32	24/32	24/32	16/32	20/32	24/32
<b>Dart TFA (in²)</b>	0.78	0.78	0.442	0.442	0.442	0.196	0.306	0.196
<b>Total Tool TFA (in²)</b>	2.74	3.643	3.305	1.8	2.343	2.09	1.19	2.09
<b>Bypass TFA %</b>	71	78	87	75	81	91	74	91
<b>Split % Down <sup>1</sup></b>	15-20	12-14	10-12	16-23	15-16	08-10	18-24	3-5
<b>Number of Cycles (Std. / Ext. Cage) <sup>2</sup></b>		2/5			2/5		2/4	
<b>Min Flow Rate to Activate (GPM)</b>		500			400		250	
<b>Max Dart Pump Down Rate (GPM)</b>		300			250		200	

<sup>1</sup> BHA configuration and hole size will influence the % split (up to 5% variance) thus basic Pre-Job evaluation of hydraulics could be performed to ensure the right tool setup.

<sup>2</sup> Recommended to use extended cages (10 ball cycle) for use with darts.