

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



DRILLING MODE 100% Flow to BHA/Bit



DROP DART
Dart on Seat



Pumps On



PUMPS OFF Ports Closed



DISCONTINUE SPLIT FLOW

Drop 1 De-act. Ball (100% Bypass Thru Ports)



BY-PASS FLOW 100% Thru Ports Only



DROP 2 ADDITIONAL DEACT BALLS

De-act. Balls & Pressure Up



DART SHEARED THRU SEAT

Dart & Balls Land in Ball Catcher Cage



DRILLING MODE 100% FLOW TO BIT

Ready for next activation







Technical Specifications

9 1/2 & 8 1/4		6 ¾			4 3/4		
1200 +	1200 +	<1200	600 +	600+	<600	400 +	350 +
36/32	N/A	N/A	30/32	N/A	N/A	24/32	N/A
Reduced dia	Autolock	Autolock	Reduced dia	Autolock	Autolock	Reduced dia	Autolock
1.12	1.35	1.35	0.93	1.1	1.1	0.75	1.1
0.98	1.43	1.43	0.68	0.95	0.95	0.442	0.95
	2.42		1.93			1.46	
1.96	2.863	2.863	1.36	1.901	1.901	0.884	1.901
32/32	32/32	24/32	24/32	24/32	16/32	20/32	24/32
0.78	0.78	0.442	0.442	0.442	0.196	0.306	0.196
2.74	3.643	3.305	1.8	2.343	2.09	1.19	2.09
71	78	87	75	81	91	74	91
15-20	12-14	10-12	16-23	15-16	08-10	18-24	3-5
2/5			2/5			2/4	
	500		400			250	
300			250			200	
	36/32 Reduced dia 1.12 0.98 1.96 32/32 0.78 2.74 71	1200 + 1200 + 36/32 N/A Reduced dia Autolock 1.12 1.35 0.98 1.43 2.42 1.96 2.863 32/32 32/32 0.78 0.78 2.74 3.643 71 78 15-20 12-14 2/5 500	1200 + 1200 + <1200 36/32 N/A N/A Reduced dia Autolock Autolock 1.12 1.35 1.35 0.98 1.43 1.43 2.42 1.96 2.863 2.863 32/32 32/32 24/32 0.78 0.78 0.442 2.74 3.643 3.305 71 78 87 15-20 12-14 10-12 2/5 500	1200 + 1200 + <1200	1200 + 1200 + < 1200 600 + 600 + 36/32 N/A N/A 30/32 N/A Reduced dia Autolock Autolock Reduced dia Autolock 1.12 1.35 1.35 0.93 1.1 0.98 1.43 1.43 0.68 0.95 2.42 1.93 1.96 2.863 2.863 1.36 1.901 32/32 32/32 24/32 24/32 24/32 0.78 0.78 0.442 0.442 0.442 2.74 3.643 3.305 1.8 2.343 71 78 87 75 81 15-20 12-14 10-12 16-23 15-16 2/5 500 400	1200 + 1200 + < 1200 600 + 600 + < 600 36/32 N/A N/A 30/32 N/A N/A Reduced dia Autolock Reduced dia Autolock Autolock 1.12 1.35 1.35 0.93 1.1 1.1 0.98 1.43 1.43 0.68 0.95 0.95 2.42 1.93 1.90 1.901 1.901 32/32 32/32 24/32 24/32 24/32 16/32 0.78 0.78 0.442 0.442 0.442 0.196 2.74 3.643 3.305 1.8 2.343 2.09 71 78 87 75 81 91 15-20 12-14 10-12 16-23 15-16 08-10 2/5 500 400	1200 + 1200 + <1200 600 + 600 + <600 400 + 36/32 N/A N/A N/A N/A N/A Autolock Reduced dia Autolock Autolock Reduced dia Autolock Autolock Reduced dia 1.12 1.35 1.35 0.93 1.1 1.1 0.75 0.98 1.43 1.43 0.68 0.95 0.95 0.442 1.96 2.863 2.863 1.36 1.901 1.901 0.884 32/32 32/32 24/32 24/32 24/32 16/32 20/32 0.78 0.78 0.442 0.442 0.442 0.196 0.306 2.74 3.643 3.305 1.8 2.343 2.09 1.19 71 78 87 75 81 91 74 15-20 12-14 10-12 16-23 15-16 08-10 18-24 2/5 500 400 2

¹ 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.

² Recommended to use extended cages (10 ball cycle) for use with darts.