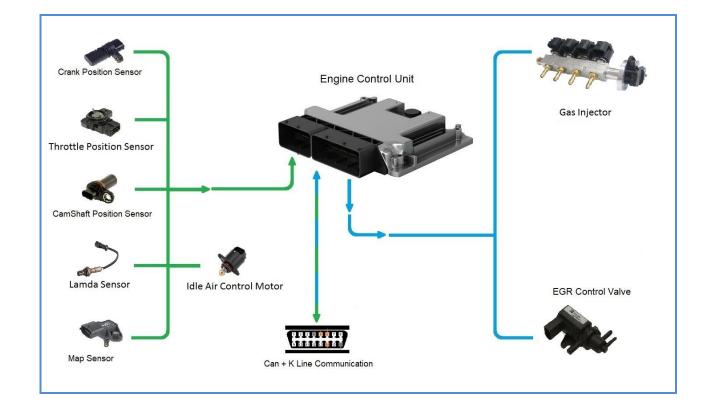


#### Manifold Gas Injection Kit with Open ECU and EGR (Product Code: R&DU01)

The Manifold injection kit is suitable for any single cylinder engine. The gas is injected in the manifold of the engine intake. The Electronic Control unit of a standard aftermarket Gas Kit cannot be adopted for use in research engine, because of the fact that in a standard Gas kit the injection start angle and the duration of injection are results of preprogrammed value from multidimensional maps in the ECU. While a part of the research requirement itself is finding the optimal Map values at conditions/variable as desired by the researcher. Hence we provide an open loop Electronic Control Unit (OPECU) where the user can decide the injection start angle and the injection duration.

This Electronic Control Unit is designed, programmed and tested in our company and are not available in general market/not for open market. Our Electronic Control Unit is only sold to high end research users. It's also Evident that the cost of Legion Brothers Gas Manifold injection Kit cannot be compared with cost of Gas kits being fitted on automobile for regular use.



#### Gas injection Open ECU with EGR



## **Components of GAS Open ECU with EGR**

- Crankshaft position sensor (Measures crankshaft position)
- Camshaft position sensor (Measures camshaft position)
- MAF Sensor (Measures mass air flow)
- Map sensor (Measures manifold temperature and pressure)
- Engine Control Unit (To Measure sensors and control series of actuators on an internal combustion engine and ensure excellent engine performance)
- Gas injector (For fuel injection)
- EGR Valve (Re-circulates controlled flow of exhaust gas into the intake)
- Can + K line (For calibration and Troubleshoot)



# Manifold Gas Injection Kit with Open ECU and EGR (Product Code: R&DU01)

Manifold Gas Injection Kit with	n Open ECU and EGR
ECU processor	Infineon
Crankshaft position	Crank trigger wheel
Camshaft position	Cam trigger wheel
Crank position sensor	Variable reluctance sensor
Cam position sensor	Hall effect sensor
Мар	NTC
Software	Engine control system
Entry pipe fitting	Fitting for Wire Braided Rubber Tube carrying gas from tank to Pressure Reducer
Reducer 1st Stage	Chamber that allows a reduction of gas pressure to 1-2 Bar, Also allows a manual
	regulation of the outlet pressure in order to meet the requirement of the engines.
Outlet fitting	Fitting for wire Braided Tube at the outlet of the reducer, to the engine
Injector	12 V
Fuel Measurement	Load cell with Indicator



## Gas injection Open ECU with EGR Functionality (Tunable Maps)

- Set idle Speed (The user can set the required idle speed of the engine)
- Closed loop control for idling (ECU controls the injection until engine idle)
- Start of injection (The user can set the start of injection angle as desired)
- Injection Duration (The user can set the Injection duration in terms of crank angle as desired)
- Injection pressure (1bar)
- EGR (The user can set the EGR flow as desired)
- Calibration charts are provided for Injection Quantity at various pressure

MG/ST RPM	0.00	5.00	7.50	10.00	12.50	15.00	20.00	25.00	30.00	35.00	40.0	45.00	55.00	60.00
5000	13.5°	13.5°	13.5°	13.5°	16.1°	18.2°	21.0°	23.7°	25.8°	27.1°	27.6	28.1	28.1°	28.1°
4500	13.1°	13.1°	13.1°	13.1°	15.1°	17.5°	20.5°	23.4°	25.5°	26.8°	27.3	27.9*	27.9°	27.9°
4000	12.4°	12.4°	12.4°	12.4°	13.8°	15.4°	18.1°	21.0°	23.1°	25.0°	25.99	27.0°	27.0°	27.0°
3500	11.4°	11.4°	11.4°	11.4°	12.6°	13.7°	15.1°	18.4°	19.9°	21.8°	23.0	24.1	24.1°	24.1°
3250	11.0°	11.0°	11.0°	11.0°	11.8°	12.8°	13.3°	15.9°	16.9°	19.0°	21.1	22.5°	22.5°	22.5°
3000	10.4°	10.4°	10.4°	10.4°	10.9°	11.7°	11.6°	13.8°	15.1°	16.3°	18.69	19.8°	19.8°	19.8°
2750	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	12.0°	12.7°	14.0°	16.5	17.6°	17.6°	17.6°
2500	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.5°	11.2°	12.2°	14.7	15.9°	15.9°	15.9°
2250	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.8°	11.1°	12.5	14.0°	14.0°	14.0°
2000	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.4°	10.99	12.0°	12.0°	12.0°
1750	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.1°	10.8	12.1	12.1°	12.1°
1500	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.0°	10.1°	11.5	13.0°	13.0°	13.0°
1250	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.09	12.0°	12.0°	12.0°
1000	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.09	12.0°	12.0°	12.0°
	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.0°	12.04	12.0°	12.0°	12.0°
800														
				1	7	10		1	10					
MG/ST RPM	0.00	3.00	7.40	10.00	12.40	15.0		-			25.00	29.00	33.00	51.00
MG/ST RPM 3612	850.00	850.00	850.00	850.00	850.00	850.0	850.	00 850	.00 85	0.00	850.00	850.00	850.00	850.00
MG/ST RPM 3612 3423	850.00 365.00	850.00 365.00	850.00 395.00	850.00 420.00	850.00 450.00	0 850.0 495.0	0 850. 0 550.	00 850 00 630	.00 85 .00 72	0.00 8 0.00 1	850.00 795.00	850.00 820.00	850.00 850.00	850.00 850.00
мд/ST RPM 3612 3423 2750	850.00 365.00 285.00	850.00 365.00 295.00	850.00 395.00 335.00	850.00 420.00 365.00	850.00 450.00 385.00	850.0           495.0           420.0	850. 550. 460.	00 850 00 630 00 510	.00 85 .00 72 .00 58	0.00 8 0.00 1 5.00 6	350.00 795.00 550.00	850.00 820.00 760.00	850.00 850.00 850.00	850.00 850.00 850.00
MG/ST RPM 3612 3423 2750 2499	850.00 365.00 285.00 285.00	850.00 365.00 295.00 285.00	850.00 395.00 335.00 335.00	850.00 420.00 365.00 365.00	850.00 450.00 385.00 385.00	850.0           495.0           420.0           410.0	850. 550. 460. 460.	00         850           00         630           00         510           00         500	.00 85 .00 72 .00 58 .00 56	0.00 ( 0.00 ( 5.00 ( 0.00 (	350.00 795.00 650.00 625.00	850.00 820.00 760.00 745.00	850.00 850.00 850.00 790.00	850.00 850.00 850.00 850.00
MG/ST RPM 3612 3423 2750 2499 2247	850.00 365.00 285.00 285.00 275.00	850.00 365.00 295.00 285.00 275.00	850.00 395.00 335.00 335.00 325.00	850.00 420.00 365.00 365.00 360.00	850.00 450.00 385.00 385.00 385.00	850.0           495.0           495.0           420.0           410.0	0         850.1           10         550.1           10         460.1           10         450.1           10         450.1	00         850           00         630           00         510           00         500           00         495	.00 85 .00 72 .00 58 .00 56 .00 54	0.00 8 0.00 1 5.00 6 0.00 6 5.00 6	350.00 795.00 550.00 525.00 500.00	850.00 820.00 760.00 745.00 730.00	850.00 850.00 850.00 790.00 775.00	850.00 850.00 850.00 850.00 850.00
MG/ST 8PM 3612 3423 2750 2499 2247 1995	850.00 365.00 285.00 285.00 275.00 275.00	850.00 365.00 295.00 285.00 275.00	850.00 395.00 335.00 335.00 325.00 320.00	850.00 420.00 365.00 365.00 360.00 360.00	850.00 450.00 385.00 385.00 385.00 385.00	850.0           495.0           420.0           420.0           410.0           410.0           415.0	00         850.1           10         550.1           10         460.1           10         450.1           10         450.1           10         440.1           10         450.1	00         850           00         630           00         510           00         500           00         495           00         480	.00 85 .00 72 .00 58 .00 56 .00 54 .00 52	0.00 8 0.00 8 5.00 8 5.00 8 5.00 8	350.00 795.00 550.00 525.00 500.00 500.00	850.00 820.00 760.00 745.00 730.00 710.00	850.00 850.00 850.00 790.00 775.00	850.00 850.00 850.00 850.00 850.00 850.00
MG/ST RPM 3612 3423 2750 2499 2247 1995 1743	850.00 365.00 285.00 285.00 275.00 275.00 250.00	850.00 365.00 295.00 285.00 275.00 275.00	850.00 395.00 335.00 335.00 325.00 320.00 305.00	850.00 420.00 365.00 365.00 360.00 360.00 330.00	850.00 450.00 385.00 385.00 385.00 385.00 380.00	850.0           495.0           420.0           420.0           410.0           410.0           410.0           410.0           410.0           410.0           410.0           410.0           410.0	0         850.1           0         550.1           0         460.1           0         450.1           0         450.1           0         440.1           0         440.1           0         440.1           0         440.1           0         440.1	00         850           00         630           00         510           00         500           00         495           00         480           00         470	.00 85 .00 72 .00 58 .00 56 .00 54 .00 52 .00 53	D.00     1       D.00     1       S.00     1       D.000     1       S.000     1       S.000     1       S.000     1       D.000     1	350.00 795.00 550.00 525.00 500.00 500.00 500.00	850.00 820.00 760.00 745.00 730.00 710.00 685.00	850.00 850.00 850.00 790.00 775.00 775.00	850.00 850.00 850.00 850.00 850.00 850.00
MG/ST 3612 3423 2750 2499 2247 1995 1743 1596	850.00 365.00 285.00 285.00 275.00 275.00 245.00	850.00 365.00 295.00 285.00 275.00 275.00 250.00 245.00	850.00 395.00 335.00 325.00 320.00 305.00 295.00	850.00 420.00 365.00 365.00 360.00 360.00 330.00 330.00	850.00 450.00 385.00 385.00 385.00 385.00 385.00 380.00 380.00 365.00	850.00           495.00           495.00           420.00           410.00           410.00           410.00           410.00           410.00           415.00           405.00           405.00           405.00           405.00           405.00           405.00	IO         850.1           IO         550.1           IO         460.1           IO         450.1           IO         450.1           IO         440.1           IO         450.1           IO         440.2           IO         440.3           IO         450.1           IO         450.2           IO         445.3	00         850           00         630           00         510           00         500           00         495           00         480           00         470	.00         85           .00         72           .00         58           .00         54           .00         54           .00         53           .00         53           .00         53           .00         53	D.00     3       D.00     3       5.00     6       D.00     6       D.00     6       D.00     6       D.00     6       D.00     5       D.00     5       D.00     5	350.00 795.00 550.00 525.00 500.00 500.00 585.00 585.00	850.00 820.00 760.00 745.00 730.00 710.00 685.00 690.00	850.00 850.00 790.00 775.00 775.00 775.00	850.00 850.00 850.00 850.00 850.00 850.00 850.00
MG/ST RPM 3612 3423 2750 2499 2247 1995 1743	850.00 365.00 285.00 285.00 275.00 275.00 250.00 245.00 245.00	850.00           365.00           295.00           285.00           275.00           275.00           245.00           245.00	850.00           395.00           335.00           335.00           325.00           320.00           320.00           320.00           295.00           290.00	850.00           420.00           365.00           365.00           360.00           360.00           330.00           330.00	850.00 450.00 385.00 385.00 385.00 385.00 385.00 380.00 365.00	850.0           495.0           495.0           420.0           410.0           410.0           415.0           405.0           390.0           380.0	00         850.           00         550.           00         460.           00         450.           00         440.           00         450.           00         450.           00         450.           00         450.           00         450.           00         450.           00         450.           00         420.	00         850           00         630           00         510           00         500           00         495           00         480           00         470           00         460	.00         85           .00         72           .00         58           .00         56           .00         54           .00         52           .00         53           .00         53           .00         53	0.00     1       5.00     6       5.00     6       5.00     6       5.00     6       5.00     6       5.00     6       5.00     5       5.00     5       5.00     5       5.00     5	350.00 795.00 550.00 525.00 500.00 500.00 585.00 585.00 585.00	850.00 820.00 760.00 745.00 730.00 710.00 685.00 690.00 690.00	850.00 850.00 790.00 775.00 775.00 775.00 790.00	850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00
MG/ST 3612 3423 2750 2499 2247 1995 1743 1596	850.00 365.00 285.00 285.00 275.00 275.00 245.00	850.00           365.00           295.00           285.00           275.00           275.00           250.00           245.00           245.00	850.00 395.00 335.00 325.00 320.00 305.00 295.00	850.00 420.00 365.00 365.00 360.00 360.00 330.00 330.00	850.00 450.00 385.00 385.00 385.00 385.00 385.00 380.00 380.00 365.00	850.0           495.0           495.0           420.0           410.0           410.0           415.0           405.0           390.0           380.0	00         850.           00         550.           00         460.           00         450.           00         440.           00         450.           00         450.           00         450.           00         450.           00         450.           00         450.           00         450.           00         420.	00         850           00         630           00         510           00         500           00         495           00         480           00         470           00         460	.00         85           .00         72           .00         58           .00         56           .00         54           .00         52           .00         53           .00         53           .00         53	0.00     1       5.00     6       5.00     6       5.00     6       5.00     6       5.00     6       5.00     6       5.00     5       5.00     5       5.00     5       5.00     5	350.00 795.00 550.00 525.00 500.00 500.00 585.00 585.00	850.00 820.00 760.00 745.00 730.00 710.00 685.00 690.00 690.00 720.00	850.00 850.00 790.00 775.00 775.00 775.00 790.00 850.00	850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00
MG/ST 3612 3423 2750 22499 2247 1995 1743 1596 1491	850.00 365.00 285.00 285.00 275.00 275.00 250.00 245.00 245.00	850.00           365.00           295.00           285.00           275.00           275.00           245.00           245.00	850.00           395.00           335.00           335.00           325.00           320.00           320.00           320.00           295.00           290.00	850.00           420.00           365.00           365.00           360.00           360.00           330.00           330.00	850.00 450.00 385.00 385.00 385.00 385.00 385.00 380.00 365.00	850.0           495.0         495.0           420.0         410.0           410.0         410.0           410.0         410.0           410.0         410.0           410.0         410.0           410.0         410.0           405.0         405.0           390.0         390.0           380.0         380.0	00         850           00         550           01         460           02         450           03         440           04         450           05         440           06         440           07         440           08         440           09         445           010         445           010         445           010         420           010         420	00         850           00         630           00         510           00         500           00         495           00         480           000         470           000         470           000         460           000         495	.00         85           .00         72           .00         58           .00         54           .00         54           .00         53           .00         53           .00         53           .00         53           .00         53	0.00     1       0.00     1       5.00     1       5.00     1       5.00     1       5.00     1       5.00     1       5.00     1       5.00     1       5.00     1       5.00     1       5.00     1       5.00     1       5.00     1	350.00 795.00 550.00 525.00 500.00 500.00 585.00 585.00 585.00	850.00 820.00 760.00 745.00 730.00 710.00 685.00 690.00 690.00	850.00 850.00 790.00 775.00 775.00 775.00 775.00 850.00 850.00	850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00
MG/ST 3612 3423 2750 2499 2247 1995 1743 1596 1491 1386	850.00 365.00 285.00 285.00 275.00 275.00 250.00 245.00 245.00	850.00           365.00           295.00           285.00           275.00           275.00           250.00           245.00           245.00	850.00           395.00           335.00           335.00           325.00           320.00           305.00           290.00           290.00	850.00           420.00           365.00           365.00           365.00           360.00           360.00           330.00           330.00           330.00	850.00 450.00 385.00 385.00 385.00 385.00 385.00 380.00 365.00 350.00 350.00	850.0           495.0           495.0           420.0           410.0           410.0           410.0           415.0           405.0           405.0           390.0           380.0           385.0           410.0	BSS0.           00         SSO.           01         SSO.           02         460.           03         450.           04         450.           05         445.           06         445.           07         445.           08         445.           09         445.           010         420.           02         435.           03         435.	00         850           00         630           00         510           00         500           00         495           00         470           00         470           00         460           00         495           00         450           00         450           00         500	.00         85           .00         72           .00         58           .00         54           .00         52           .00         53           .00         53           .00         53           .00         53           .00         53           .00         53           .00         53           .00         53	0.00     1       0.00     1       5.00     1	350.00       795.00       550.00       525.00       500.00       500.00       500.00       500.00       500.00       500.00       500.00       500.00       500.00       500.00       500.00       500.00       500.00       500.00       500.00       500.00       500.00       500.00       500.00	850.00 820.00 760.00 745.00 730.00 710.00 685.00 690.00 690.00 720.00	850.00 850.00 790.00 775.00 775.00 775.00 790.00 850.00	850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00
MG/ST 3612 3423 2750 2499 2247 1995 1743 1596 1491 1386 1239	850.00           365.00           285.00           285.00           275.00           275.00           250.00           245.00           245.00           245.00	BS0.00           365.00           295.00           285.00           275.00           275.00           245.00           245.00           245.00	B50.00           395.00           335.00           335.00           325.00           320.00           305.00           290.00           290.00           290.00	850.00           420.00           365.00           365.00           360.00           360.00           360.00           300.00           300.00           300.00           300.00           300.00           300.00           300.00           300.00	850.00           450.00           450.00           385.00           385.00           385.00           385.00           385.00           385.00           385.00           385.00           385.00           385.00           385.00           385.00           385.00           355.00	850.0           495.0           420.0           420.0           410.0           410.0           410.0           410.0           410.0           410.0           410.0           410.0           410.0           410.0           410.0           410.0           410.0           410.0           390.0           385.0           410.0           410.0	00         850.           01         550.           02         460.           03         450.           04         450.           01         450.           02         440.           03         440.           04         450.           04         450.           05         445.           06         420.           07         425.           08         455.           09         455.           00         455.           01         455.           02         455.	00         850           00         630           00         510           00         500           00         495           00         490           00         470           00         400           00         460           00         540           00         540	.00         85           .00         72           .00         58           .00         54           .00         52           .00         53           .00         53           .00         55           .00         59           .00         59           .00         59           .00         59           .00         59           .00         59	0.00     1       0.00     1       5.00     6       5.00     6       5.00     1       5.00     1       5.00     1       5.00     1       5.00     1       5.00     1       5.00     1       5.00     1       5.00     1       5.00     1       5.00     1       5.00     1       5.00     1       5.00     1       5.00     1       5.00     1       5.00     1       5.00     1       5.00     1       6     1       6     1	350.00 795.00 350.00 325.00 300.00 300.00 385.00 385.00 385.00 385.00 390.00	850.00 820.00 760.00 745.00 730.00 685.00 690.00 690.00 720.00 835.00	850.00 850.00 790.00 775.00 775.00 775.00 775.00 850.00 850.00	850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00
MG/ST 3612 3423 2750 2499 2247 1995 1795 1596 1491 1386 1239 924	850.00           365.00           285.00           285.00           275.00           275.00           245.00           245.00           245.00           245.00           245.00	BS0.00           365.00           295.00           285.00           275.00           275.00           245.00           245.00           245.00           245.00           245.00	BS0.00           395.00           335.00           335.00           325.00           320.00           320.00           290.00           290.00           275.00           240.00	850.00           420.00           365.00           365.00           360.00           360.00           360.00           360.00           360.00           360.00           360.00           360.00           300.00           300.00           300.00           310.00           315.00	850.00           450.00           450.00           385.00           385.00           385.00           385.00           385.00           385.00           385.00           385.00           385.00           385.00           385.00           385.00           385.00           350.00           350.00           355.00           360.00	850.0           495.0           495.0           420.0           410.0           410.0           410.0           410.0           410.0           410.0           410.0           410.0           405.0           405.0           390.0           380.0           385.0           410.0           405.0           405.0           405.0           405.0	00         850.           00         550.           01         460.           02         450.           03         440.           04         450.           05         440.           06         450.           07         440.           08         450.           09         440.           010         420.           010         420.           010         435.           010         460.           010         510.           011         515.	000         8500           001         6300           000         5100           000         5000           000         4950           000         4700           000         4700           000         4600           000         5400           000         5400           000         5400           000         5400	.00         85           .00         72           .00         58           .00         54           .00         54           .00         53           .00         53           .00         53           .00         53           .00         53           .00         53           .00         53           .00         53           .00         53           .00         53           .00         53           .00         53           .00         54           .00         53           .00         54           .00         54           .00         54           .00         54           .00         54           .00         54           .00         54           .00         54           .00         54           .00         54           .00         54	0.00     1       0.00     1       5.00     6       5.00     6       5.00     1       5.00	350.00 795.00 350.00 325.00 300.00 300.00 385.00 385.00 390.00 390.00 380.00	850.00 820.00 760.00 745.00 730.00 710.00 685.00 690.00 690.00 720.00 835.00	850.00 850.00 790.00 775.00 775.00 775.00 775.00 850.00 850.00	850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00
MG/ST 3612 3423 2750 2499 2247 1995 1795 1491 1386 1239 924 860	850.00           365.00           285.00           285.00           275.00           275.00           245.00           245.00           245.00           245.00           245.00           245.00           245.00           245.00           245.00	BS0.00           365.00           295.00           285.00           275.00           275.00           245.00           245.00           245.00           245.00           245.00	BS0.00           395.00           335.00           335.00           325.00           320.00           305.00           290.00           290.00           275.00           240.00	850.00           420.00           365.00           365.00           360.00           360.00           300.00           330.00           330.00           300.00           310.00           315.00	850.00           450.00           385.00           385.00           385.00           385.00           385.00           385.00           385.00           385.00           385.00           385.00           385.00           385.00           385.00           385.00           385.00           350.00           350.00           350.00           350.00           350.00           350.00           350.00           350.00           350.00	850.0           495.0           495.0           495.0           420.0           410.0           410.0           410.0           410.0           410.0           410.0           410.0           410.0           410.0           410.0           405.0           385.0           410.0           405.0           425.0           425.0           425.0	Big         Signal           00         S50.           00         S50.           00         460.           00         450.           00         440.           00         450.           00         450.           00         450.           00         440.           01         420.           01         420.           01         435.           01         460.           01         510.           01         515.           01         622.	000         8500           000         6300           000         5100           000         5000           000         4900           000         4700           000         4700           000         4700           000         4700           000         4500           000         5400           000         5750           000         6000           000         8500	NO         85           .00         72           .00         58           .00         54           .00         54           .00         53           .00         54           .00         54 <td>0.00     1       5.00</td> <td>350.00 795.00 50.00 525.00 500.00 500.00 55.00 55.00 590.00 50.00 50.00 50.00 50.00</td> <td>850.00 820.00 740.00 745.00 730.00 685.00 690.00 690.00 835.00 835.00</td> <td>850.00 850.00 790.00 775.00 775.00 775.00 775.00 850.00 850.00 850.00 850.00</td> <td>850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00</td>	0.00     1       5.00	350.00 795.00 50.00 525.00 500.00 500.00 55.00 55.00 590.00 50.00 50.00 50.00 50.00	850.00 820.00 740.00 745.00 730.00 685.00 690.00 690.00 835.00 835.00	850.00 850.00 790.00 775.00 775.00 775.00 775.00 850.00 850.00 850.00 850.00	850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00 850.00

