

## Pneumatics

Designed for vessels with reverse reduction gears and diesel engines in the higher horsepower range, the ZF Marine Electronics AD12 pneumatic control systems, individually set to specific vessel requirements, offer reliable sequencing, timing and positioning. Immediate benefits include increased maneuvering efficiency, faster response time, and reduced clutch and gear load.



To keep engines and gears working longer and better, every ZF Marine Electronics AD12 has a built-in automatic speed boost and proportional neutral pause. The AD12 proportional neutral pause offers maximum engine and gear protection by automatically adjusting the neutral gear duration to vessel speed, keeping the clutches disengaged and the throttle at idle for the optimum period of time. The AD12 speed boost, designed to prevent engine stalls under load, increases idle RPM as the clutch begins to engage.

Our AD14 pneumatic control systems, designed for vessels with engines in the lower horsepower range, is a compact system with an economy of manifold mounted components. Because engines on these vessels are smaller and respond more quickly to load changes, the AD14 offers a fixed (rather than proportional) neutral pause and does not include the speed boost offered with our AD12 system.

The AD14 is an ideal choice for retrofit projects. The AD14 can be installed directly onto any existing pneumatic system and is an ideal timing mechanism for shaft brakes and bow thrusters.

A permanent serial number tracking system gives our service technicians the ability to review the custom characteristics of every ZF Marine Electronics pneumatic control system we supply.

Designed to be compatible with any vessel layout, our pneumatic propulsion controls are available for hydraulic or pneumatic clutches and mechanically or pneumatically operated governors. We can also provide an electro-pneumatic transducer to convert a pneumatic input signal to a directly proportional DC current or voltage output.



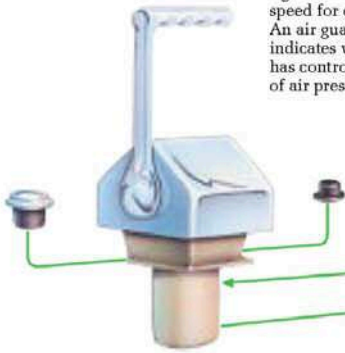
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St. Louis, MO 63137  
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# HUMCO ENGINE CONTROLS

## ZF Marine Pneumatics

Our AD12 and AD14 control systems sequence speed, clutch and ShaftBrakes for safe, efficient maneuvering.

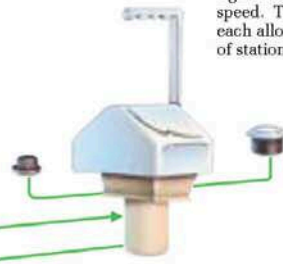
**Single-lever Control**  
A single lever pneumatic control valve provides air signals for direction and speed for each engine. An air gauge at each station indicates whether a station has control and the amount of air pressure available.



**Station Junction Panel**  
The AD12 and AD14 allow for multiple stations. The station junction panel connects each additional station for transferring station command and signals to the air drive circuit.



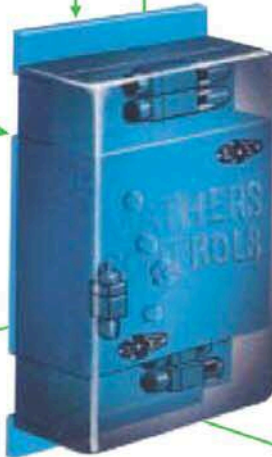
**CH5 Control Head**  
One control head per engine per station provides air signals for direction and speed. The AD12 and AD14 each allow for any number of stations.



**Air Treatment Panel**  
Designed to accept an air supply of 125 to 250psi, the AD12 and AD14 air treatment panel filters airborne particulates down to 5 microns.



**Control Unit**  
The heart of the system, the control unit contains the mechanisms that control the timing or sequencing of maneuvers. (Artwork depicts AD12 control unit; AD14 control unit is similar but more compact.)



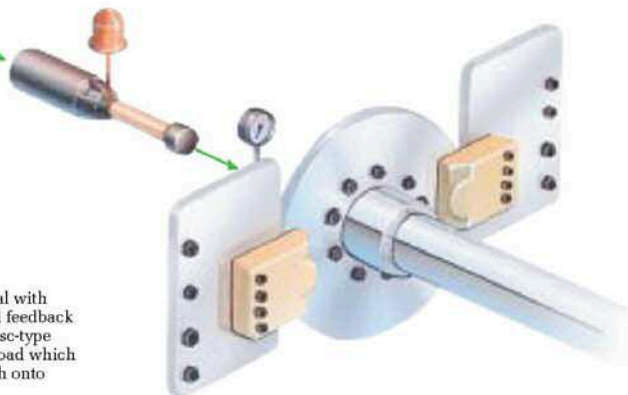
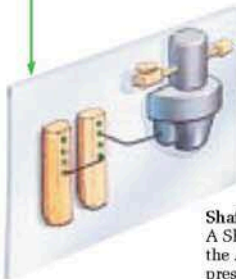
**Governor**  
The governor controls engine speed from idle to full. The AD12 and AD14 are designed to work with the mechanically or pneumatically-operated governors and can be equipped with an electro-pneumatic transducer to convert a pneumatic input signal to a directly proportional DC current or voltage output.



**Clutch**  
The AD12 and AD14 can be used with either hydraulic or pneumatic clutches.



**ShaftBrake Control Panel**  
A ShaftBrake control panel (optional with the AD12 and AD14) uses clutch oil feedback pressure to automatically control disc-type propeller shaft brakes, putting the load which normally falls to the engaging clutch onto the brake instead.





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AIR DRIVES	PART NUMBER
CONTROL CIRCUIT	AD12-5000
SERVICE KIT - L/M [AD12 - 5000]	AD12-5001
CONTROL CIRCUIT	AD14-4000
SERVICE KIT - L/M [AD14 - 4000]	AD14-4001

MAJOR AD12 / AD14 CIRCUIT COMPONENTS	PART NUMBER
SPOOL VALVE - CLUTCH	AD12-2101
SPOOL VALVE - SUPPLY	AD12-2201
SPOOL VALVE - SPEED INTERRUPT (2 PER UNIT)	AD12-2301
SPOOL VALVE - SPEED BOOST	AD12-2401
SPOOL VALVE - NEUTRAL DELAY	AD14-2501
SHUTTLE VALVE (2 PER UNIT)	VS2-1000

THESE UNITS ARE NO LONGER IN PRODUCTION  
(Service sheets AD5 - S-124; AD6 - B5-40 & S-145)

AD5-4800 AND AD6-3400 CONTROL CIRCUITS - REPAIR KITS ONLY	PART NUMBER
SPOOL VALVE - SPEED: replacement for AD5-1642-10	AD5-1643
SPOOL VALVE - SUPPLY: replacement for AD5-1742-1	AD5-1743
OVERHAUL KIT - L/M (AD6 - 1843) *Includes O-rings and cartridge valve kit	AD6-3403
OVERHAUL KIT - L/M (AD6 - 1950) *Includes O-rings and cartridge valve kit	AD6-3404
OVERHAUL KIT - L/M (AD5 - 1146) *Includes O-rings and cartridge valve kit	AD5-4803
OVERHAUL KIT - L/M (H - 3/CI - 0914) *Includes O-rings, dirt protector, diaphragm, gasket	AD5-4807
OVERHAUL KIT - L/M (volume) *Includes O-rings, ball and spring	AD5-4808
SERVICE KIT - L/M [AD5 - 1643/1743] *Includes O-rings, wrench, screws, and seal	AD5-4809



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PANELS INCLUDE FILTER, REGULATOR (S) AND VENTED BALL VALVE  
(Service sheet S-211)

AIR TREATMENT - PANELS	PART NUMBER
AIR TREATMENT PANEL, ONE REGULATOR	AT11-1100
AIR TREATMENT PANEL, TWO REGULATORS	AT11-2100
AIR TREATMENT PANEL, THREE REGULATORS	AT11-3100

REPAIR KITS INCLUDE FILTER KIT, REGULATOR KIT AND O-RINGS

SERVICE KIT FOR AT11-1100	AT11-1101
SERVICE KIT FOR AT11-2100	AT11-2101
SERVICE KIT FOR AT11-4100)	AT11-3101

MAJOR AIR TREATMENT COMPONENTS	PART NUMBER
FILTER, 1/2 MANUAL DRAIN, 40 MICRON (Service sheet B5-77)	F74G-4AN-QD3
REGULATOR - 1/2, 5-150 # (Service sheet B5-76, norgren)	R74G-4AK-RMN
REGULATOR - 1/2, 5-250# (Service sheet B5-76, norgren)	R74G-4AT-RSN
REGULATOR - 1/4, 2-125# (AR1-0700-2)	R119-02C
REGULATOR - 1/2, 5-250# (AR2-0700-3)	R119-04D

AIR TREATMENT COMPONENT SERVICE KITS	PART NUMBER
REPAIR KIT - FILTER, TYPE F74G	4380-700
REPAIR KIT - REGULATOR, TYPE R74G (Service sheet B5-77)	4381-700
REPAIR KIT - REGULATOR, MOD 119-4	RK119A
REPAIR KIT - REGULATOR, MOD 119-6 (AR3-0802)	RK119B
REPAIR KIT - REGULATOR, MOD 362/364	RK119Y
REPAIR KIT - REGULATOR, TYPE R12	5550-08



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REPAIR KITS INCLUDE FILTER KIT AND REGULATOR KIT

SERVICE KIT - L/M (AT11 - 1000)	AT11-1001
SERVICE KIT - L/M (AT11-2000/AT11-3000)	AT11-2001
SERVICE KIT - L/M (AT11-4000)	AT11-4001
SERVICE KIT - REGULATOR, MOD 10,0-200 PSI	CI-0753

Ball VALVES (Parker Ball Valves)	PART NUMBER
BALL VALVE - 1/2, NON-VENTED	V500P-8
BALL VALVE - 1/2, VENTED	VV500P-8

CONTROL HEADS - Mechanical	PART NUMBER
CONTROL HEAD (CHROME) (Service sheet B4-13)	CH8-1200

SINGLE LEVER CONTROL OF SHIFT AND SPEED

CONTROL HEADS - PNEUMATIC	PART NUMBER
CONTROL HEAD (CHR-5C), (10-70 PSI)	CH5-5400-05
CONTROL HEAD (CHR-6C), (30-70 PSI)	CH5-5400-06
CONTROL HEAD (CHR-7C), (10-60 PSI)	CH5-5400-07
CONTROL HEAD (CHR-5C-IR), (10-70 PSI)	CH5-5400-15
CONTROL HEAD (CHR-6C-IR), (30-70 PSI)	CH5-5400-16
CONTROL HEAD (CHR-7C-IR), (10-60 PSI)	CH5-5400-17
CONTROL HEAD (CHROME - FALK)	CH5-6000
CONTROL HEAD (CHR-6C-SHT LEVER)	CH5-08069
CONTROL HEAD (SHORT LEVER-3C)	CH10-12033
CONTROL HEAD (CHR-LH-2C)	CH10-3000-02
CONTROL HEAD (CHR-LH-2C-IR)	CH10-3000-12



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CONTROL HEADS - PNEUMATIC	PART NUMBER
CONTROL HEAD (CHR-RH-2C-KNOB LEVER)	CH10-3500-02
CONTROL HEAD (STD-CHROME)	CH11-5000
REPAIR KITS INCLUDE O-RINGS CARTRIDGE VALVES, SUPPLY SPRING, LUNGER RETURN SPRING, SUPPLY SEAT, AND BALANCE PISTON.	
UPDATE/OVERHAUL KIT - L/M (CH5-3400 TO MOD A) *Includes u-cup seal and poppet cartridge valve (Service sheet B4-12)	CH5-5402
OVERHAUL KIT - L/M (CH5-5400) *Includes cartridge valve and filter (Service sheet B4-20)	CH5-5406

POSITIONERS - ACTUATORS	PART NUMBER
POSITIONER (EXTENDING) (Service sheet B3-01)	PA1-1500E
POSITIONER (RETRACTING) (Service sheet B3-01)	PA1-1500R
POSITIONER (EXTENDING) (SPRING ROD) (Service sheet B3-04)	PA4-2900E
POSITIONER (RETRACTING) (SPRING ROD) (Service sheet B3-04)	PA4-2900R
ACTUATOR - 3 POSITION, SPRING CENTERED (Service sheet B3-08)	P57378-1000
CLUTCH ACTUATOR ASSEMBLY (TWIN DISC) (Service sheet A3-08)	PB7-08032

MAJOR AD14 CIRCUIT COMPONENTS	PART NUMBER
CAM-MACHINED (10-70 PSI)	CH5-1201-5
CAM-MACHINED (30-70 PSI)	CH5-1201-6
CAM-MACHINED (10-60 PSI)	CH5-1201-7
CAM-MACHINED (FALK SLIP)	CH5-1201-8
CAM-MACHINED (10-80 PSI)	CH5-1201-9



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CLUTCH BOXES	PART NUMBER
CIRCUIT BOX (CLUTCH) (140 PSI)	CB1-1600L-1
CIRCUIT BOX (CLUTCH) (125 PSI)	CB1-1600L-2
CIRCUIT BOX (CLUTCH/BRAKE) (140 PSI)	CB2-1800L-1
CIRCUIT BOX (CLUTCH/BRAKE) (125 PSI)	CB2-1800L-2
CIRCUIT BOX (SLIP/BRAKE) (140 PSI)	CB3-3000L-1
CIRCUIT BOX (SLIP/BRAKE) (125 PSI)	CB3-3000L-2
CIRCUIT BOX (SLIP) (140 PSI)	CB8-2700L-1
CIRCUIT BOX (SLIP) (125 PSI)	CB8-2700L-2

POSITIONERS - ACTUATORS	PART NUMBER
ACTUATOR (CLUTCH/BRAKE) (Service sheet B3-10)	PA3-4200
CLUTCH/BRAKE ACTUATOR ASSEMBLY (TWIN DISC) (Service sheet A3-08)	PB7-08039

### SERVICE KITS

SERVICE KIT - L/M (PA1 - PA4) *Includes seals, O-ring, and wiper	PA1-1501
SERVICE KIT - L/M (PA3 - 4100) *Includes packing ring and P59819 kit	PA3-4101
SERVICE KIT - (PA3-4200) *Includes spool valve kit, shuttle valve kit and P59819 kit	PA3-4201
SERVICE KIT - L/M [PA7-2700] *Includes seals, O-ring, and wiper	PA7-2701
REPAIR KIT - ACTUATOR, MOD P57378	P59819

QUICK EXHAUST VALVES	PART NUMBER
QUICK EXHAUST VALVE (1/4) (Service sheet B5-32)	QE2-1/4
QUICK EXHAUST VALVE 3/8" (Service sheet B5-32)	QE3-3/8
QUICK EXHAUST VALVE 1/2" (Service sheet B5-32)	QE4-1/2
QUICK EXHAUST VALVE 3/4" (Service sheet B5-32)	QE5-3/4



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SERVICE KITS INCLUDE O-RING AND DIAPHRAGM

SERVICE KIT - QUICK EXHAUST, MODELS QE1, QE2, QE3	SRK-QE
SERVICE KIT - QUICK EXHAUST, MODELS QE4, QE5	SRK-QE45

QUICK RELEASE VALVES	PART NUMBER
QUICK RELEASE VALVE (Service sheet B5-28)	QR3-0100
QUICK RELEASE VALVE 1/4" (Service sheet B5-31)	P52935-0002

REGULATORS	PART NUMBER
REGULATOR - 1/2, PILOT OPERATED, LESS GAGE	11-042-003
REGULATOR - 1/4, 2-150#, MOD 10	10262

REGULATOR REPAIR KITS	PART NUMBER
REPAIR KIT - REGULATOR, TYPE 11-042	4158-03

RELAY VALVES	PART NUMBER
RELAY VALVE (Service sheet B5-11)	RV4-2600
RELAY VALVE (Service sheet B5-70)	RV5-1500-2
RELAY VALVE (Service sheet B5-72)	RV8-1600
RELAY VALVE (CW-4 PSI/DEG) (Service sheet B5-64)	RV9-2800
RELAY VALVE (CCW-4 PSI/DEG) (Service sheet B5-64)	RV9-2900

SERVICE KITS INCLUDE O-RING AND DIAPHRAGM

SERVICE KIT FOR RV4-2600 *Includes washers, diaphragm, spacer ring, piston, and EA-12129 kit	RV08920
SERVICE KIT FOR RV5-1600 *Includes O-rings and poppet cartridge valve	RV5-1601





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### SERVICE KITS

SERVICE KIT FOR R8-1600 *Includes O-rings and poppet cartridge valve	RV8-1601
SERVICE KIT FOR RV9-2800, 2900 *Includes O-rings, caps, valve seats and stem, and diaphragm	RV9-1301

SHUTTLE VALVES HYDRAULIC	PART NUMBER
SHUTTLE VALVE, 3/8 NPT (Service sheet B5-34)	2458C-1

SHUTTLE VALVES PNEUMATIC	PART NUMBER
SHUTTLE VALVE WITH MANIFOLD (SP) (Service sheet B5-54)	VS2-1100
SHUTTLE VALVE - 1/4 NPT (Service sheet B5-30)	P54350-0002
SHUTTLE VALVE - 1/8 OR 1/4 NPT, BP	SV-3-M

### SERVICE KITS

SERVICE KIT - L/M [SV-3-M] *Includes O-rings	CI-1058
SERVICE KIT - L/M [P54350] *Includes gasket and diaphragm	CI-1060
SERVICE KIT (VS2-1000) *Includes O-rings, screw, ball and wrench	VS2-1001

SPOOL VALVES	PART NUMBER
SPOOL VALVE - CLUTCH (Service sheet B5-47)	AD12-2101
SPOOL VALVE - SUPPLY (Service sheet B5-48)	AD12-2201
SPOOL VALVE - SPEED INTERRUPT (Service sheet B5-49)	AD12-2301
SPOOL VALVE - SPEED BOOST (Service sheet B5-50)	AD12-2401
SPOOL VALVE - NEUTRAL DELAY (Service sheet B5-53)	AD14-2501
SPOOL VALVE (3-WAY) (Service sheets B5-63, B5-66, and B5-67)	SV2-10-0101
SPOOL VALVE (3-WAY/S-RET) (Service sheets B5-63, B5-66, and B5-67)	SV2-11-0100
SPOOL VALVE (3-WAY/S-RET) (Service sheets B5-63, B5-66, and B5-67)	SV2-11-0101



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SPOOL VALVES	PART NUMBER
SPOOL VALVE (3-WAY/S-RET) (Service sheets B5-63, B5-66, and B5-67)	SV2-12-0100
SPOOL VALVE (3-WAY/S-RET) (Service sheets B5-63, B5-66, and B5-67)	SV2-12-0101
SPOOL VALVE (3-WAY/S-RET) (Service sheets B5-63, B5-66, and B5-67)	SV2-13-0100
SPOOL VALVE (3-WAY/S-RET) (Service sheets B5-63, B5-66, and B5-67)	SV2-17-0100
SPOOL VALVE (3-WAY/S-RET) (Service sheets B5-63, B5-66, and B5-67)	SV2-17-0101
SPOOL VALVE (3-WAY/S-RET/MAN) (Service sheets B5-63, B5-66, and B5-67)	SV2-11-0100-1
SPOOL VALVE (3-WAY/S-RET/MAN) (Service sheets B5-63, B5-66, and B5-67)	SV2-12-0100-1
SPOOL VALVE (3-WAY/S-RET/MAN) (Service sheets B5-63, B5-66, and B5-67)	SV2-17-0100-1
SPOOL VALVE (4-WAY) (Service sheets B5-63, B5-66, and B5-67)	SV2-20-0101
SPOOL VALVE (4-WAY/MAN) (Service sheets B5-63, B5-66, and B5-67)	SV2-20-0101-1
SPOOL VALVE (4-WAY/S-RET) (Service sheets B5-63, B5-66, and B5-67)	SV2-21-0100
SPOOL VALVE (4-WAY/S-RET/MAN) (Service sheets B5-63, B5-66, and B5-67)	SV2-21-0100-1
SPOOL VALVE (4-WAY/S-CEN) (Service sheets B5-63, B5-66, and B5-67)	SV2-54-0101
SPOOL VALVE-4 WAY, 1/2 (Manufacturer's data sheet - Versa spool valves)	VJJ-4514-MM-31
SPOOL VALVE - 3 WAY, 1/2	VWS-3512-15S-31

### SPOOL VALVE SERVICE KITS

SERVICE KIT - L/M [VWS] *Includes O-rings and u-cup seal	CI-1037
SERVICE KIT - L/M [VJJ] *Includes O-rings and u-cup seal	CI-1038
SERVICE KIT - L/M [SV2-ALL] *Includes O-rings, wrench, screws and seals	SV2-3501



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STATION JUNCTION PANELS	PART NUMBER
JUNCTION PANEL (Service sheet B5-54)	SJ7-1000
JUNCTION PANEL - TRANSFER (Service sheet S-205)	SJ8-4000
JUNCTION PANEL - TRANSFER (Service sheet S-206)	SJ8-4100
JUNCTION PANEL - DIRECTED TRANSFER (Service sheet S-207)	SJ8-4200
JUNCTION PANEL - TRANSFER (Service sheet S-208)	SJ9-5000
JUNCTION PANEL - TRANSFER (Service sheet S-209)	SJ9-5100
JUNCTION PANEL - DIRECTED TRANSFER (Service sheet S-210)	SJ9-5200

JUNCTION PANEL SERVICE KITS	PART NUMBER
SERVICE KIT - L/M (SJ5-1000)	SJ5-1001
SERVICE KIT - L/M (SJ8-2000/SJ8-2100)	SJ8-2001
SERVICE KIT - L/M (SJ7-1000) *Includes shuttle valve kit	SJ7-1001
SERVICE KIT - L/M (SJ8-2300) *Includes O-RING, packing ring, gasket and diaphragm	SJ8-2301
SERVICE KIT - L/M (SJ8-4000,4100,4200) *Includes SPOOL valve kit and shuttle valve kit	SJ8-3201
SERVICE KIT - L/M (SJ9-3400/SJ9-3500) *Includes O-ring, packing ring, gasket and diaphragm	SJ9-3401
SERVICE KIT - L/M (SJ9-3600) *Includes O-ring, packing ring, gasket and diaphragm	SJ9-3601
SERVICE KIT - L/M (SJ9-5000,5100,5200) *Includes spool valve kit and shuttle valve kit	SJ9-4201

TEST GAUGE PANELS	PART NUMBER
TEST GAUGE PANEL (3 GA) (Service sheet S-203)	TG1-1000
TEST GAUGE PANEL (4 GA) (Service sheet S-203)	TG2-1000



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TEST GAUGES	PART NUMBER
GAUGE, 2", 0-60# (Manufacturer's data sheet : NoShock)	20.110.60
GAUGE, 2", 0-100PSI, 1/4 CBM (Manufacturer's data sheet : NoShock)	20.110.100
GAUGE, 2", 0-300PSI, 1/4 CBM (Manufacturer's data sheet : NoShock)	20.110.300
GAUGE, 2-1/2", 0-200#, U-Clamp (Manufacturer's data sheet : NoShock)	25.120.200-U
GAUGE, 2-1/2", 0-3000PSI (Manufacturer's data sheet : NoShock)	25.900.3000
GAUGE, 2-1/2, 0-200#, GLYCERIN	LFP-220
GAUGE, 2-1/2 , 0-200#	154759
GAUGE - ASSEMBLY (0-100/SPEED)	MG20-0200
GAUGE - ASSEMBLY (0-200/AHEAD)	MG21-0200
GAUGE - ASSEMBLY (0-200/ASTERN)	MG21-0300
GAUGE - ASSEMBLY (0-200/BRAKE)	MG21-0400

TIMING VALVES	PART NUMBER
TIMING VALVE - MACHINED (Service sheet B5-43)	AD5-1462
TIMING VALVE - #61 (.039) (Service sheet B5-43)	AD5-1462-1
TIMING VALVE - #(.035) (Service sheet B5-43)	AD5-1462-2
TIMING VALVE - #(.031) (Service sheet B5-43)	AD5-1462-3
TIMING VALVE - #70 (.028) (Service sheet B5-43)	AD5-1462-4
TIMING VALVE - #73 (.024) (Service sheet B5-43)	AD5-1462-5
TIMING VALVE - #75 (.021) (Service sheet B5-43)	AD5-1462-6
TIMING VALVE - #77 (.018) (Service sheet B5-43)	AD5-1462-7
TIMING VALVE - #78 (.016) (Service sheet B5-43)	AD5-1462-8
TIMING VALVE - #80 (.0135) (Service sheet B5-43)	AD5-1462-9



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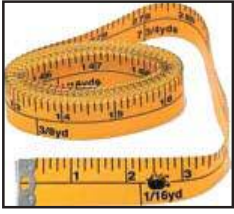


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TIMING VALVES	PART NUMBER
TIMING VALVE - #54 (.055) (Service sheet Dwg. 5358-A)	AD5-1462-55
TIMING VALVE - 1/16 (.062) (Service sheet Dwg. 5358-A)	AD5-1462-62
TIMING VALVE - #50 (.070) (Service sheet Dwg. 5358-A)	AD5-1462-70
TIMING VALVE - #44 (.086) (Service sheet Dwg. 5358-A)	AD5-1462-86
TIMING VALVE - 3/32 (.093) (Service sheet Dwg. 5358-A)	AD5-1462-93
TIMING VALVE - 7/64 (.109) (Service sheet Dwg. 5358-A)	AD5-1462-109
TIMING VALVE - 1/8 (.125) (Service sheet Dwg. 5358-A)	AD5-1462-125
TIMING VALVE - 9/64 (.140) (Service sheet Dwg. 5358-A)	AD5-1462-140
TIMING VALVE - 5/32 (.156) (Service sheet Dwg. 5358-A)	AD5-1462-156
TIMING VALVE - 11/64 (.171) (Service sheet Dwg. 5358-A)	AD5-1462-171

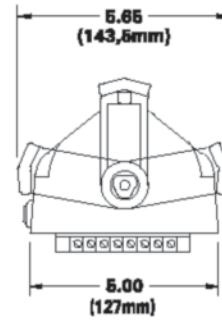
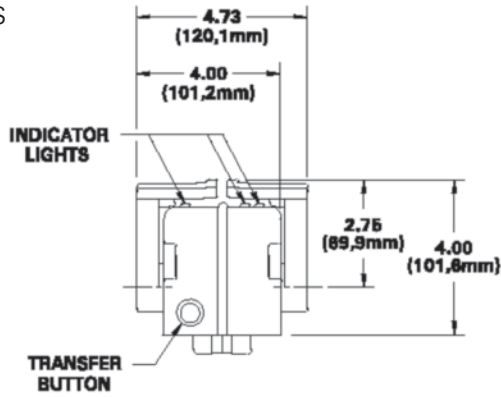


## ZF Marine Pneumatics Control Head Dimensions

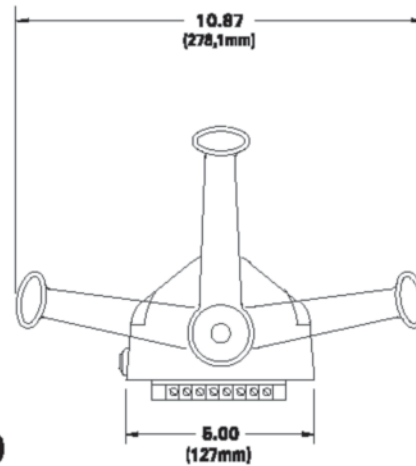
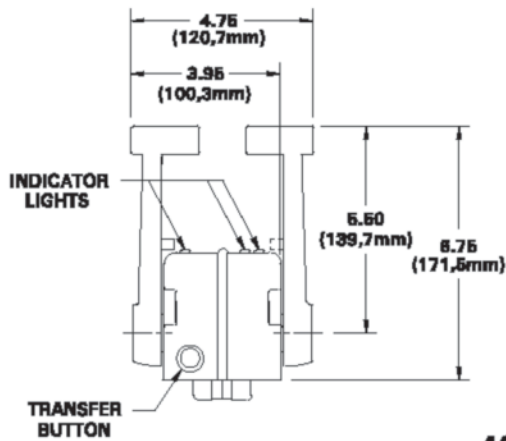


# Pneumatics Control Head Dimensions

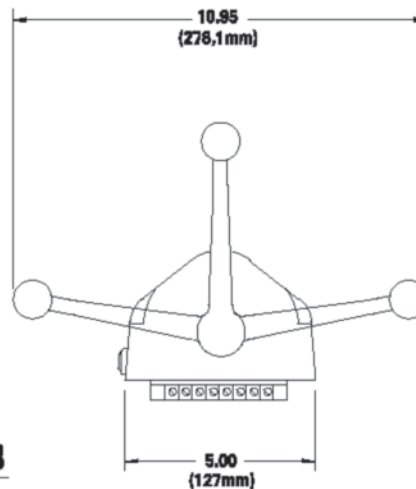
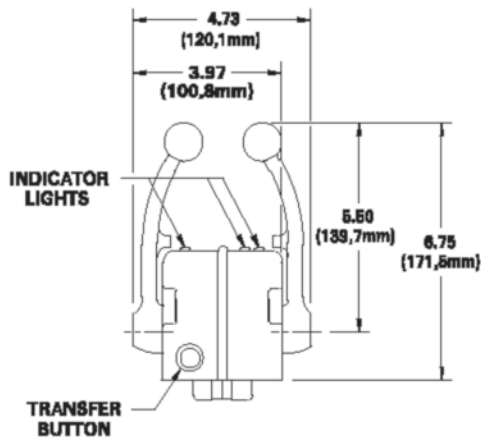
Dimensions



**456**



**460**



**463**