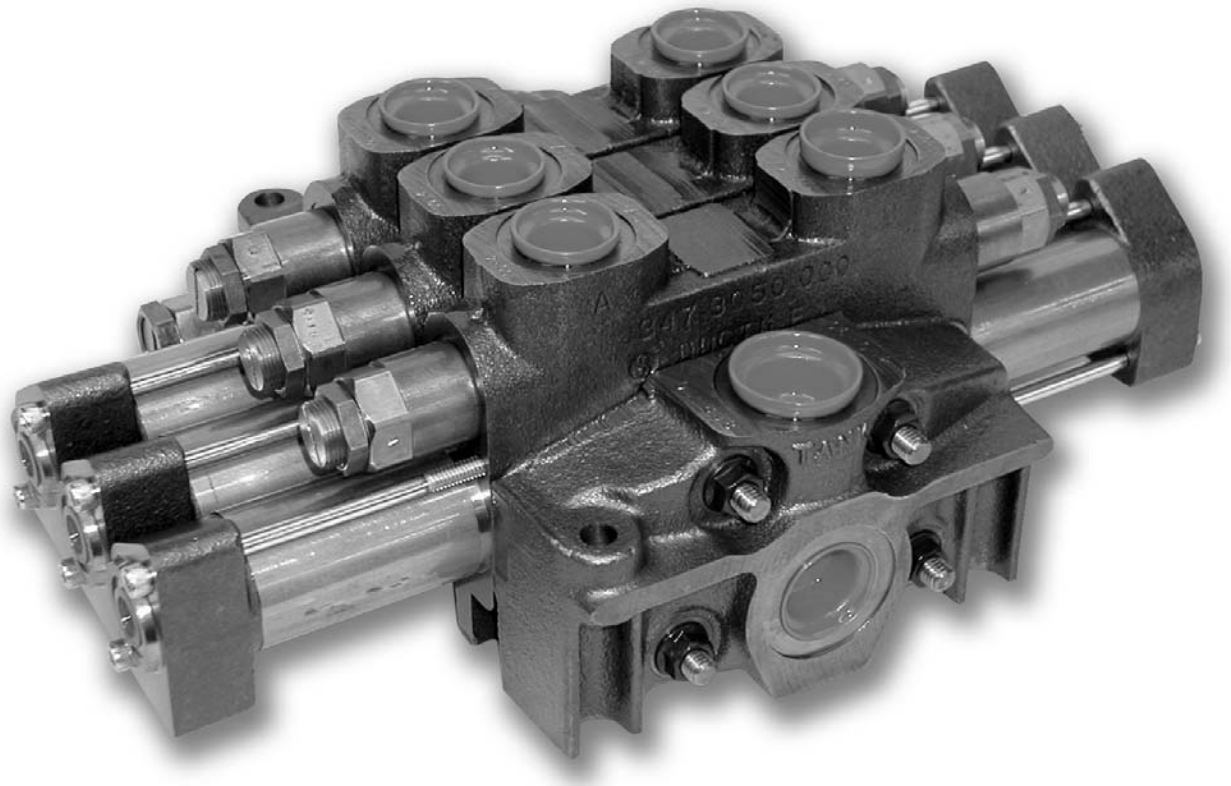
Bulletin HY14-2004-B1/US

Series VA20/35
Series VG20/35

Oil Hydraulic
Directional Control Valves

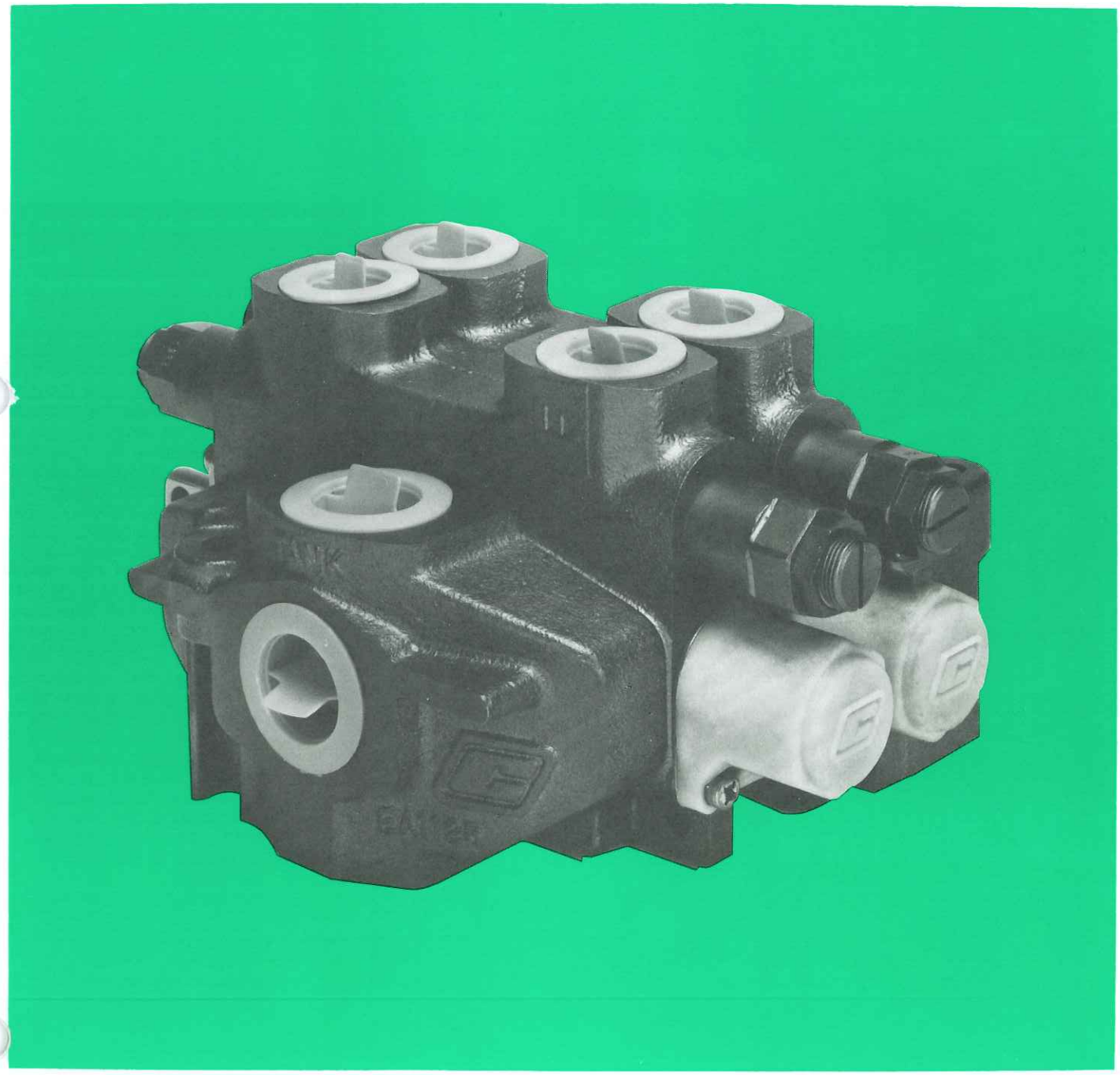
Effective: October 1, 2002
Supersedes: H-99 dated 6/99



VA20/35 • VG20/35 OIL HYDRAULIC DIRECTIONAL CONTROL VALVES

- 2500 psi/3500 psi
- 40 gpm/70 gpm
- parallel and series circuit
- choice of ten types of operation

® Commercial Intertech



Valve Division

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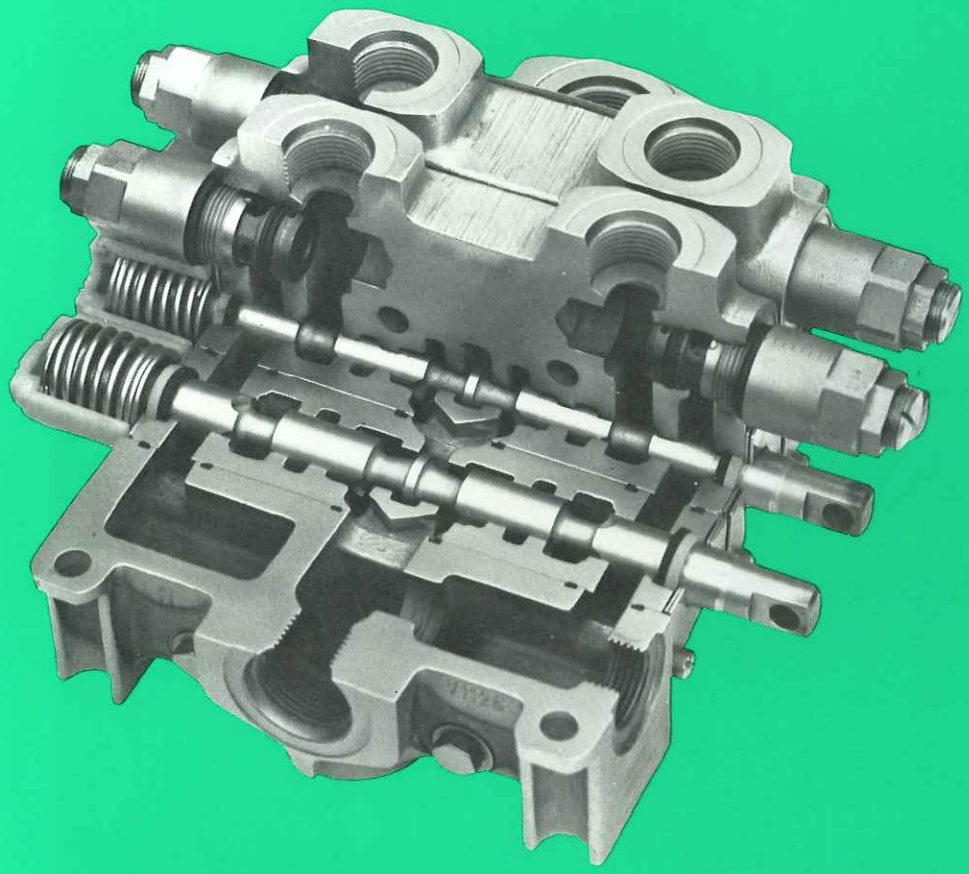
Commercial Intertech Corp. is an international manufacturer of hydraulic systems and their component pumps, motors, valves, and cylinders.

H996/99G2.5M

VA20/35
VG20/35
DIRECTIONAL CONTROL VALVES



Commercial's VA and VG model valves are contemporary versions of our well-proven A20/A35 units which have provided reliable control of fluid power for over 20 years. The VG models are cast from compacted graphite, a high strength iron alloy that allows us to rate the valves to 3500 psi. VA models are cast from gray iron and are rated at 2500 psi.

Both models are produced under Commercial's Statistical Process Control program. SPC assures you of top quality because all manufacturing processes are constantly monitored to be sure they're within tolerances. SPC is just one method Commercial is using to maintain quality, improve delivery and control costs.

As a worldwide supplier of high quality hydraulic components, we build to the same designs at all of our plants. This assures you that wherever you manufacture or wherever your equipment is used, service parts are readily available.

you get more efficient control of fluid power distribution with Commercial valves because of these important features:

- Built-in, full-flow relief valves
- Parallel and series circuits in one bank
- Manual, hydraulic, electric or pneumatic operation
- Sectional construction for maximum flexibility
- Spool changeover capability for right- or left-hand valve assemblies
- Low spool effort — improved metering

Several features are offered as standard on VA20/35 and VG20/35 valves that contribute to their outstanding performance. Symetrical timing makes changeover from left-to right-hand operation simply a matter of removing the spool and re-inserting it in the opposite direction. Spool seals are fitted in counter bores for easier maintenance and smoother spool operation. These features, combined with the extensive range of available spool functions and options, make these valves among the most versatile obtainable.

These features, and there are many more, offer advantages to the equipment manufacturer which result in superior control and equipment performance. These valves show a greatly reduced internal pressure drop under all conditions of operation.

low internal pressure drop

All valves present resistance to flow which results in pressure drop. Commercial's valves VA20/35 and VG20/35 are designed with large internal passages with uniform cross sections and smooth wall surfaces which provide flow paths free of abrupt angles. More useful fluid power is available because there is minimal internal pressure drop and less energy wasted in heat generation. Performance data for all operating conditions is plotted in tables and charts on pages 6 and 7. You can use these tables to determine the proper size valve to best meet your specific requirement.

sectional construction

These valves are of sectional, stack type, construction assembled with one or more work sections capped by inlet and outlet sections. Working sections are offered in many functional types. Special mid-inlet sections may be added in the valve bank to introduce the flow from additional pumps. Working sections with series or parallel type circuits can be assembled in thousands of combinations to tailor these valves to your needs.

pressure compensation

VA35 or VG35 parallel circuit sections can have the benefits of outlet pressure compensation. A special pressure compensation outlet automatically maintains a selected flow through any one of the valve's parallel section. The outlet's metering spool responds to changing pressure providing precise control of machine functions regardless of the level of the operator's skill.

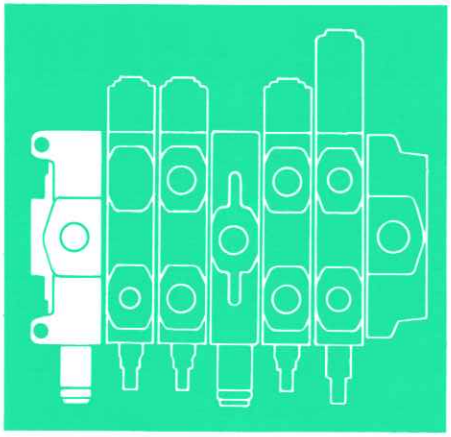
Pressure compensated outlets may be used in mixed bank (series and parallel) assemblies if the series work sections are upstream of the pressure compensated parallel sections.

full-flow relief valve protection

Full-flow system relief valves may be installed in the end inlet section.

Work sections can be provided with full-flow relief valves in either or both work ports. Port relief valves can be pilot operated with anti-cavitation checks or differential area, full-flow relief valves without anti-cavitation checks. (See graphs on pages 10 and 11.) Crossover relief valves are available.

principle components and their functions



inlet sections

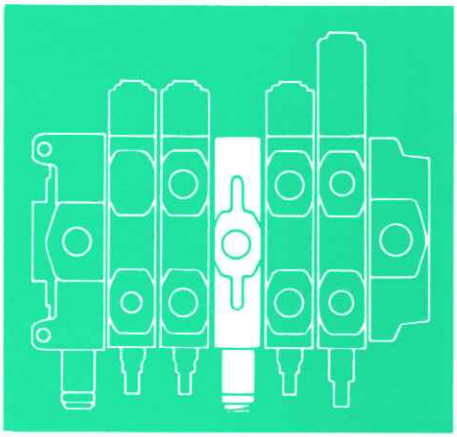
Pump flow is plumbed to stack-type directional control valves through a port placed in an inlet section. Inlet sections, are available with or without full-flow system relief valves.

end inlet

End inlets cap the valve bank at the upstream end and receive the primary pump flow. A port is placed in the top or side of the inlet to provide for piping connection.

end inlet, tank return

This style of end inlet section caps the valve bank at the upstream end and receives the primary pump discharge through a top or side port. An additional port, placed in the bottom, provides a route for low-pressure return oil to flow directly to tank. Inlet unloaders are also available. See page 26.



mid-inlet sections

mid-inlet section for split flow

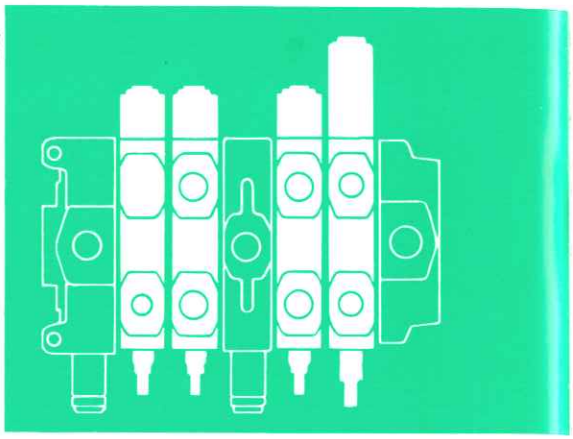
This section allows you to combine two or more independent circuits in one valve bank simplifying plumbing and installation. A split flow, mid-inlet section, positioned between two working sections, provides a method of feeding a secondary pump's flow into a valve bank and acts as an outlet for the primary pump. The secondary pump's flow is directed to that portion of the valve bank downstream from the mid-inlet. The primary pump's flow is not combined with that of the secondary pump within the valve bank. A built-in full-flow relief valve can be provided. Split flow mid-inlets with power beyond capability are also available.

for combined flow

A combined flow, mid-inlet section can be positioned between two working sections to introduce flow from a secondary pump into the valve bank. The secondary pump's flow is added to that of the primary pump to feed all downstream working sections. The primary pump flow is interrupted when an upstream section is activated but flow from secondary pump remains available. Total discharge (gpm) from primary and secondary pumps may not exceed the flow capacity of the valve bank.

for combination split or combined flow (manual selection)

This combination mid-inlet section has an integral, manually operated, two-position spool. In the split-flow position, the valve directs secondary pump flow to the downstream portion of the valve bank and directs the primary pump's discharge to tank. In the combined flow position, the two pump flows are combined at the end inlet and made available to all working sections. Combined discharge (gpm) from primary and secondary pumps may not exceed maximum flow capacity of the valve bank.



working sections

Lo-Boy sections are protected in working position by a full flow relief valve in the valve's inlet (standard valve). Hi-Boy sections can be ordered with built-in, work port relief valves in either or both ports. Hi-Boy work sections have necessarily higher profiles to accommodate the port relief valves.

Parallel and series circuits can be combined in the same valve bank and are available in both Hi-Boy and Lo-Boy sections. While both circuit types permit actuation of several machine functions, it is important to remember the primary difference between the two types.

parallel circuits

Parallel circuits are the most commonly used because more than one function can be operated simultaneously and at random. However, if two or more spools are fully operated at the same time the one with the lightest load will operate first. An operator can easily overcome this by metering back the valve controlling the lightest load.

series circuits

If more than one spool is operated, the one closest to the inlet will operate first. Return flow is directed to the open center for use by the next work section, etc. The sum of the pressures is additive and can not exceed the system pressure.

3-way • 3-position type
(work port blocked when spool in neutral) (parallel circuitry only)

In neutral, flow passes through the valve's center flow to another valve bank. This flow is the spool directs all flow out of the one port. Shifting in the opposite direction permits oil to return to tank through the same port. Use with single-acting cylinders or single-direction motors plumbed to tank.

4-way • 3-position type
(work ports blocked when spool in neutral)

Used in parallel or series circuits, both ports are opened (one for outgoing oil, one for returning oil) when the spool is shifted in either direction. Return oil goes downstream through the open center in series circuits or the tank return passage in parallel circuits. Work ports are blocked in neutral. This section controls double-acting cylinders.

4-way • 3-position type
(work ports open when spool in neutral)

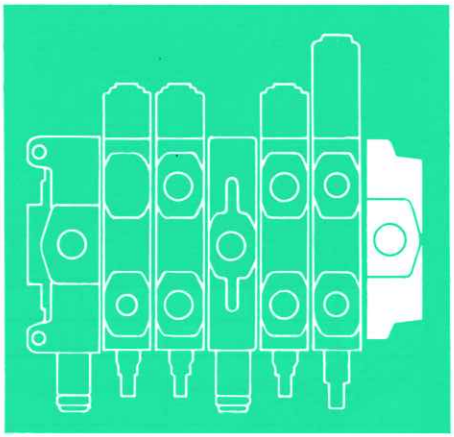
This section works the same as the 4-way 3-position cylinder type except that both work ports are connected internally to tank and blocked to pump flow when the spool is in neutral. This section is used in motor circuits.

4-way • 4-position type
(work ports blocked when spool in neutral — open in float position) (parallel circuitry only)

This type valve section stops all return flow in neutral thus stopping the motor or cylinder. The fourth spool position connects the work ports to tank which lets the operator free-wheel the motor or float the cylinder.

4-way • 4-position type
(work ports blocked when spool in neutral — regenerative flow in fourth position) (parallel circuitry only)

When the valve spool is moved into a work position, all of the flow is directed to one work port. At the same time, the other work port is opened to return flow to tank. In the regenerative position, return flow from the rod end of the cylinder is combined with flow from the pump and the additive flow is directed to cylinder's base end. Both work ports are blocked in neutral.



outlet sections

Pump flow leaves the valve through ports placed in an outlet section which caps the valve bank at the downstream end. Outlet sections are available as tank return, pressure beyond or combination types.

tank return type

Ports in the side and top of this outlet permit flow to be piped to tank. Connections can be made to either port. The port not being used must be plugged.

pressure beyond type

Two outlet ports are located in the side or top. The port nearest the centerline directs open center flow to another valve bank. This flow is available to the second bank only when all upstream work sections are in neutral. The second outlet port must be plumbed to tank.

tank return or pressure beyond (convertible)

This outlet can be converted from a tank return type to pressure beyond by inserting a special cartridge plug in the side port. This feature is useful if you anticipate the possible addition of an accessory valve after the machine is built.

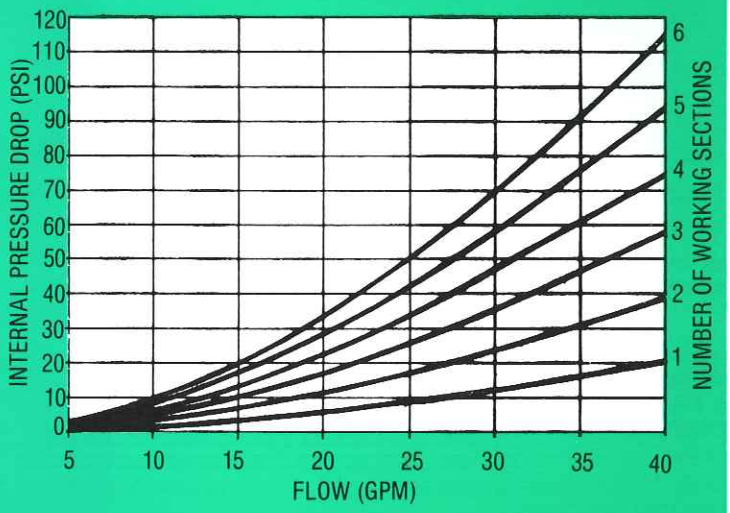
tank return priority outlet type (divided flow)

This outlet provides ports to both the tank and pressure beyond circuits. A built-in flow divider spool directs a selected portion of the flow to the pressure beyond circuit at all times and the remaining flow to tank.

VA20/VG20
performance data

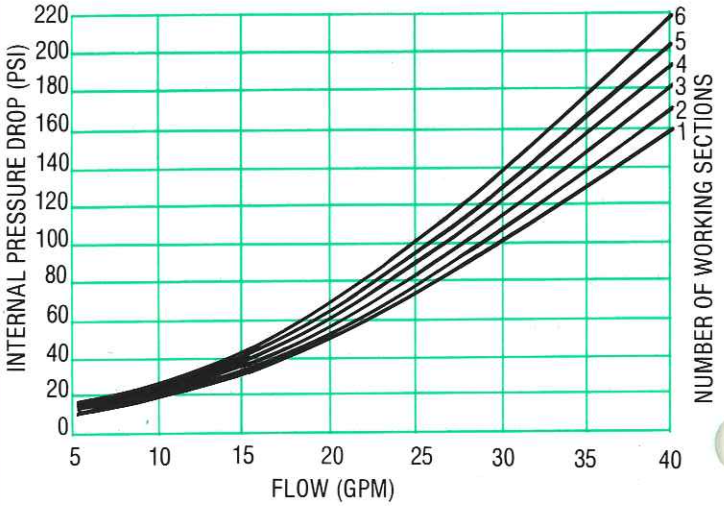
parallel circuit

inlet to outlet (SAE-16 inlet and outlet)



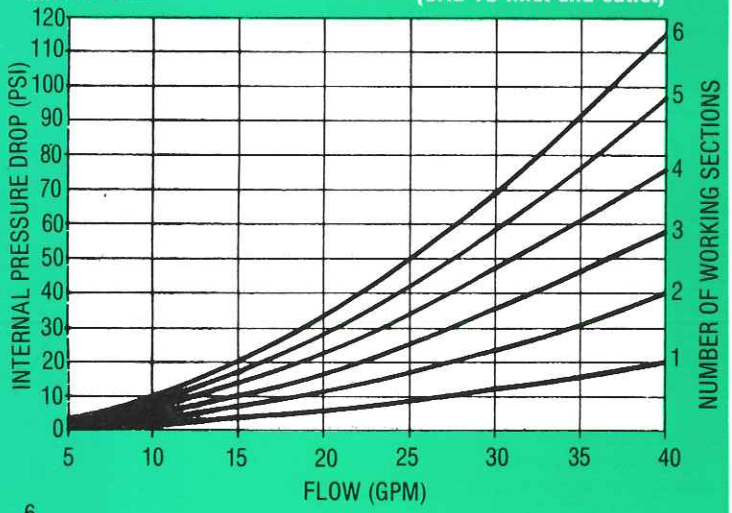
parallel circuit

inlet to work port, work port to outlet (SAE-16 inlet to SAE-12) (work ports to SAE-16 outlet)



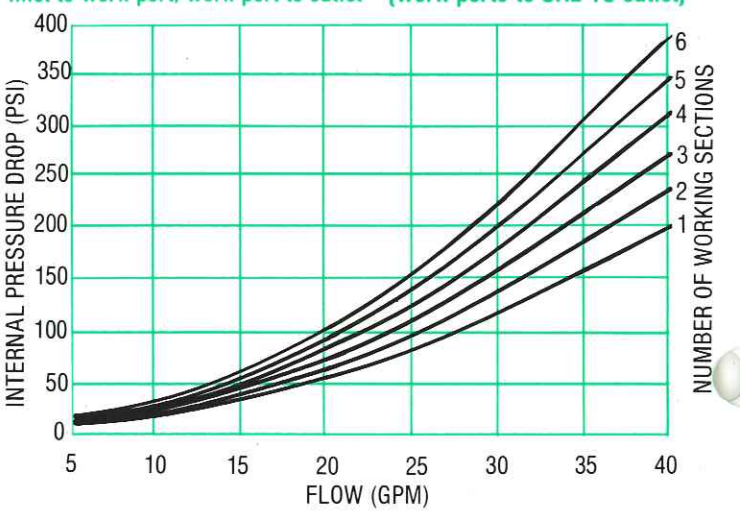
series circuit

inlet to outlet (SAE 16 inlet and outlet)



series circuit

inlet to work port, work port to outlet (SAE-16 inlet to SAE-12) (work ports to SAE-16 outlet)

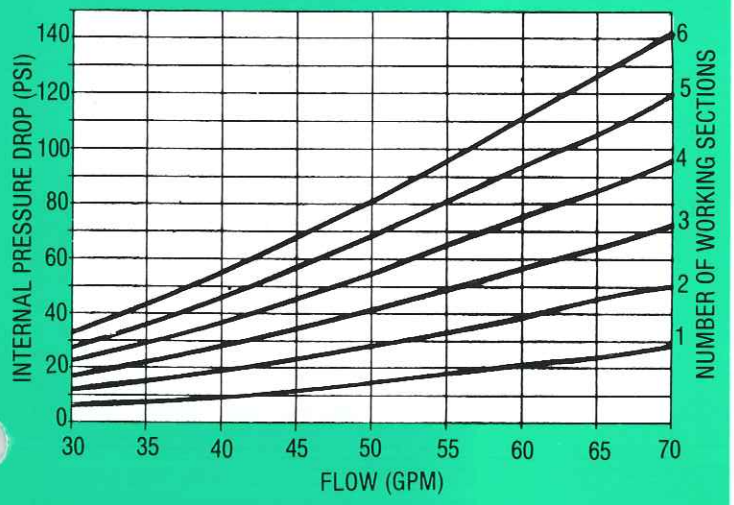


VA35/VG35
performance data

parallel circuit

inlet to outlet

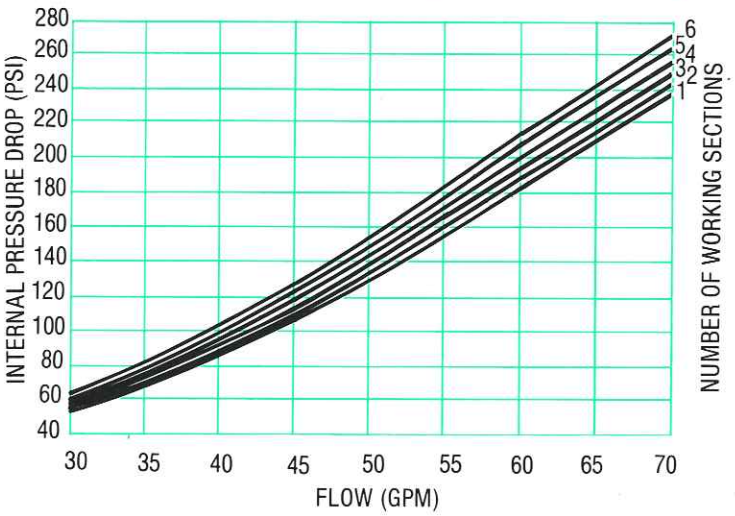
(SAE-20 inlet to SAE-16 work port to SAE-20 outlet)



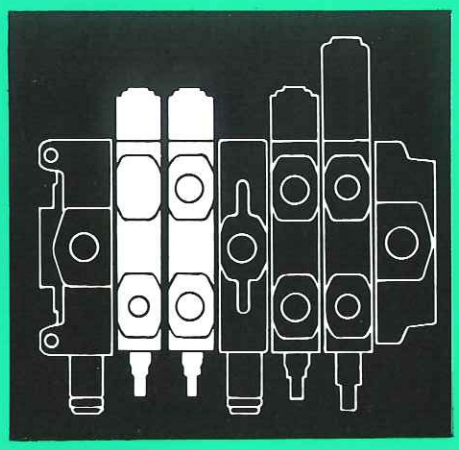
parallel circuit

inlet to work port, work port to outlet

(SAE-20 inlet and outlet)

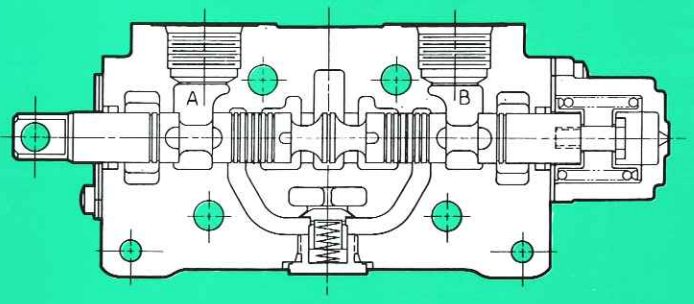


NOTE: VA models are constructed of grey iron and are rated for 2500 psi in 40 gpm (VA20) and 70 gpm (VA35) sizes. VG models are constructed of compacted graphite and are rated for 3500 psi service in corresponding gallonage sizes.

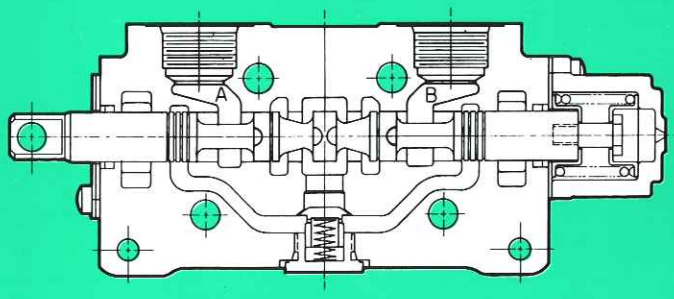


LO-BOY Working Sections

parallel



series

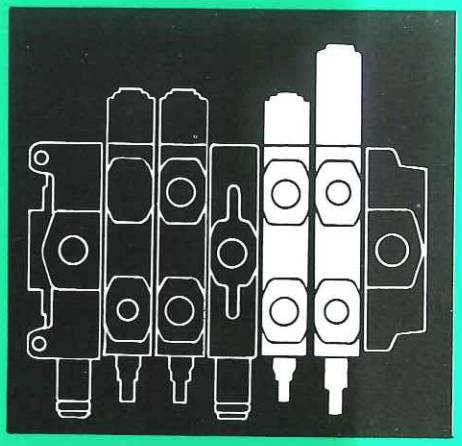


Commercial's VA and VG models are open-center, stack type valves designed primarily for heavy-duty mobile equipment applications. They work equally well with fixed or variable displacement pumps.

VA and VG valves may be used as closed center units with pressure compensated pumps. Valves are made closed center by using a power beyond outlet and plugging the high pressure port.

VA and VG valves are available in two types of work sections called Hi-Boys and Lo-Boys. Parallel or series circuits are available.

Lo-Boys can be used in most circuits requiring only the main relief valve protection provided by a cartridge relief at the inlet. Their lower profile is well suited to applications requiring compact banks such as subsurface mining equipment. Lo-Boy sections, because they require less material and machining, cost less than their Hi-Boy counterparts.



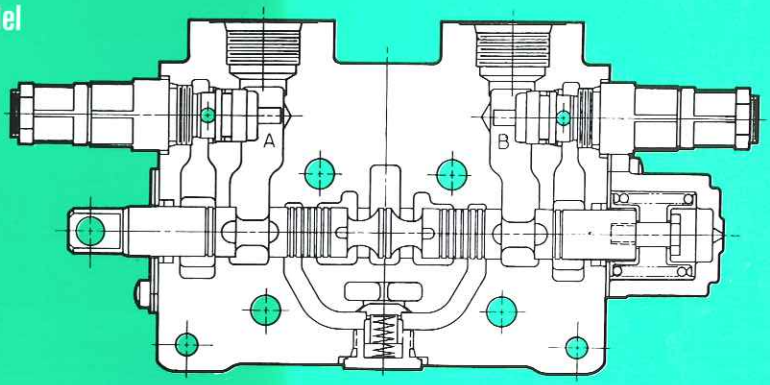
HI-BOY Working Sections

Hi-Boys, as their name implies, are made taller from top to bottom to provide room for optional port accessories. Full-flow, pilot operated relief valves with anti-cavitation checks, differential area relief valves, cross-over relief valves for motors and plain anti-cavitation checks can be built into the Hi-Boy sections.

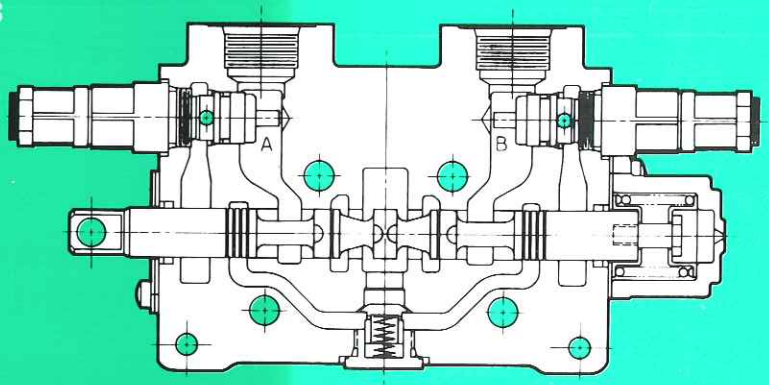
Hi-Boy and Lo-Boy sections can be assembled together in one valve bank so that sections requiring port relief valves, crossover relief or anti-cavitation checks can be inserted as needed for greater economy.

Both Hi-Boy and Lo-Boy sections are rated for 2500 psi in gray iron or 3500 psi in compacted graphite. The full range of spool actuators including electric, hydraulic, electrohydraulic, pneumatic and others shown on pages 12 and 13 can be used with either configuration.

parallel

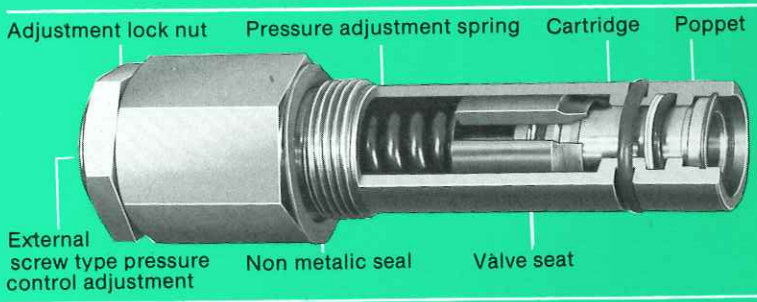


series



® Commercial Intertech

auxiliary valves
relief valves



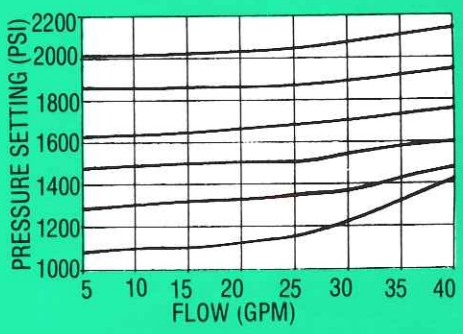
main system relief valve

Three types of relief valves are offered to protect VA- and VG-Line valves against pressure overloads. These include a pilot-operated, full-flow port relief with built-in anti-cavitation feature; a full-flow differential area port relief without anti-cavitation feature and a full-flow inlet or mid-inlet system relief.

Inlet and mid-inlet relief valve protects all downstream work sections. Port reliefs, available in Hi-Boy sections only, offer complete overload protection to each port. These are particularly useful in sections subject to overloading even in neutral position. An excavator traveling over uneven terrain with its boom extended, for example, could create hydraulic shock loads in the cylinders. Such loads should be relieved at the port to prevent damage to components.

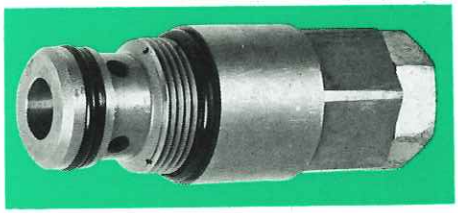
Consistent accuracy in providing adequate pressure relief protection is the hallmark of Commercial's relief valves as shown in the performance graphs below.

VA20/VG20 main relief valve performance



VA35/VG35 main relief valve performance

NOTE: Unless otherwise specified main relief valves will be screw adjusted.

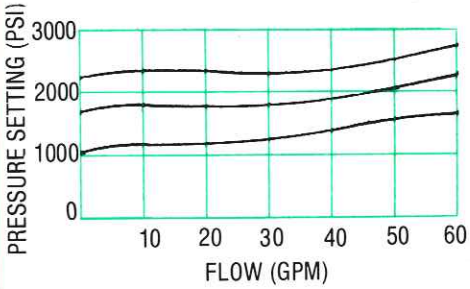


standard port relief (slug adjusted)

Full-flow, differential area type relief valves are the standard port relief valves offered for use in VG and VA valves. Available in Hi-Boy sections only.

The port relief protects the cylinder or motor to which it is plumbed against overload damage. Generally set at a higher pressure than the main system relief valve, the overload port relief functions only when the valve is in neutral. Because of their full-flow capability, they can provide relief valve protection to individual ports which must be operated at pressures below the relief valve setting for the bank assembly.

standard port relief valve performance

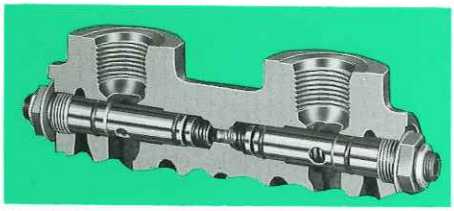


NOTE:
Also available

- Vented anti-cavitation checks
- Lockout relief valves
- Dual-pressure relief valves

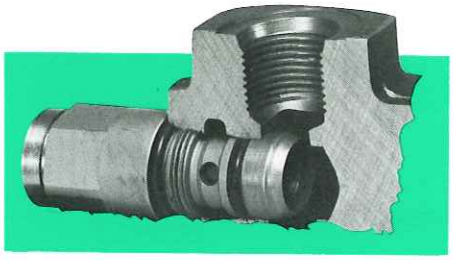
optional port relief (screw adjusted)

Full-flow, pilot-operated relief valves with built-in, anti-cavitation checks are available as port relief valves in VG and VA Hi-Boy models.



crossover relief valves (screw adjusted)

These allow high pressure to be bled from one work port to the other when the spool is in neutral to prevent an over-running motor from acting as a pump and pressurizing the system beyond its designed load. They also provide anti-cavitation protection to the opposite port.

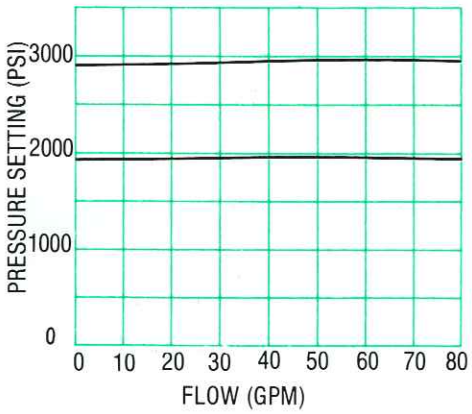


anti-cavitation vacuum check

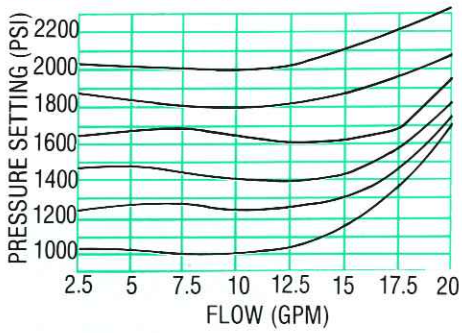
These checks are available as a built-in feature of the full-flow port relief valves or as separate units to eliminate cavitation beyond the work port. Anti-cavitation checks are available only in Hi-Boy sections.

Cavitation occurs any time an actuator under load demands more flow than the pump can supply. The anti-cavitation check bleeds oil from the tank return passage, feeding it to the low-pressure side of the actuator to fill the vacuum thus preventing cavitation. Anti-cavitation checks function when the valve is in a work position or in neutral.

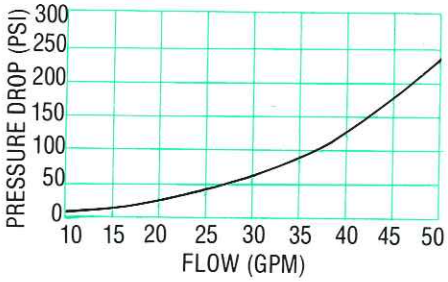
optional port relief valve performance



crossover relief valve performance

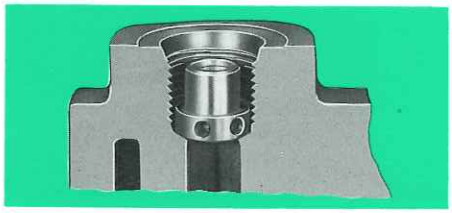


anti-cavitation check performance



transition check

Transition checks block pressurized return flow while the work section spool is shifted. This momentary holding action permits smoother cylinder or motor operation. The check blocks pressurized return flow until forced open by pressure in the parallel passage. Transition checks are standard on all cylinder work sections. Transition checks are not load-hold checks.

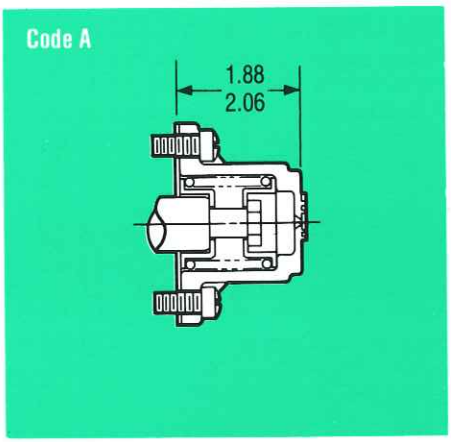


flow restrictor port check

Installed in either work port, these checks reduce return flow to a specified rate determined by the need of the application. They may be used, for example, to slow retraction of a cylinder under load.

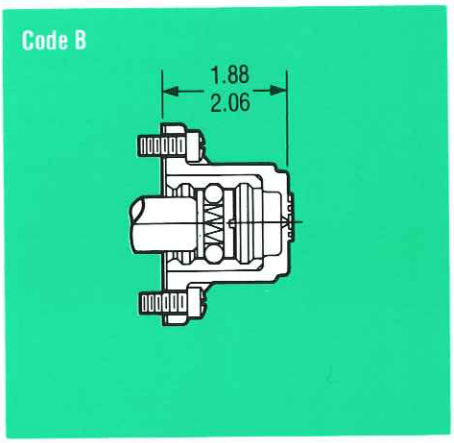
Choice of operators

dimensional data, inches VA20/VG20 / VA35/VG35



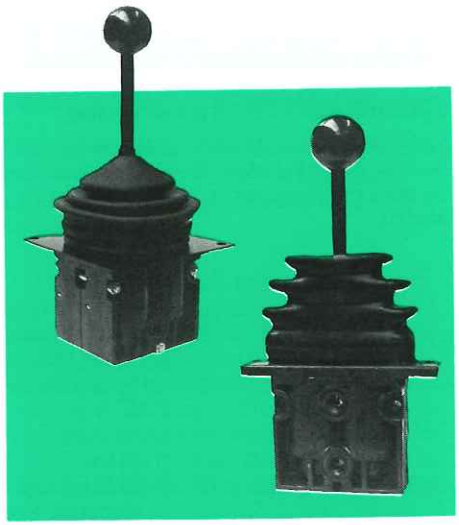
spring return

A spring in the end cap of this standard spool operator returns the spool to neutral from either work position when the control handle is released.



3-position detent

This option allows the spool to be detented in any of three positions. Spool movement from one position to another or to neutral is done manually.

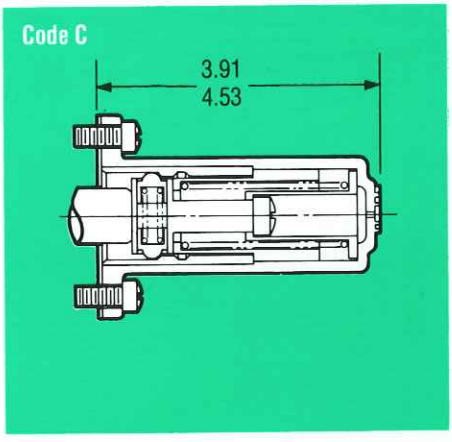


pneumatic remote controllers

Stackable and joystick models are available. They require 11.7 cfm at 100 psi. Max operating pressure is 142 psi. These lightweight units can be ordered with a variety of handle configurations to make operation of stackable sections easier. Ask for catalog H111.

VA/VG valve handles

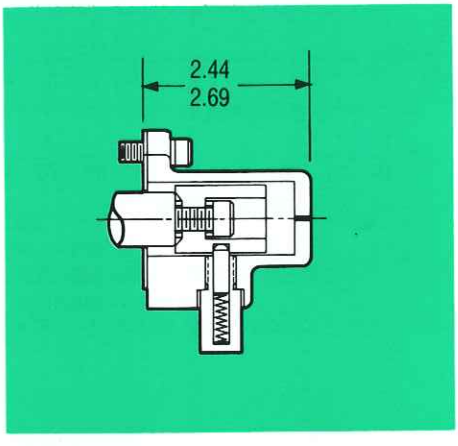
Stamped steel handles fit either Hi-Boy or Low-Boy models with or without port reliefs. Handle height may be adjusted by varying the length of threaded rod portion. Standard heights are 6", 8" and 10".



detent with spring return

When used with a float section, the spool may be detented in the float position to allow a cylinder to float or a motor to freewheel until manually shifted.

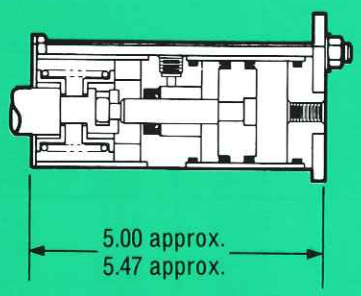
Spring action returns the spool to neutral from work positions.



rotary back cap

Rotating the control handle, instead of pushing or pulling it, actuates this spool. The handle will hold in any position between 0° and 90° either side of center to provide a continuous flow of metered oil. These units are available with stainless steel parts for marine winch applications. Buyer must supply handle.

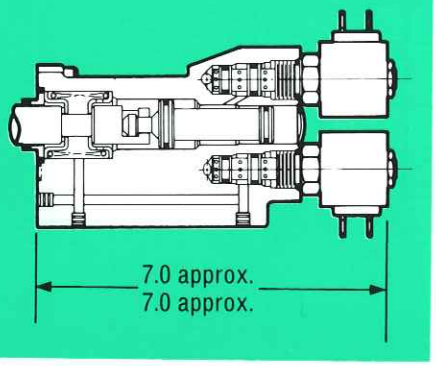
Code V



single ended pneumatic

This option uses a 100 psi pneumatic pilot, plumbed to double-acting piston on one end of the spool. This piston shifts the spool in either direction thus freeing the opposite spool end to accept a handle operator which may be used as an override.

Code K



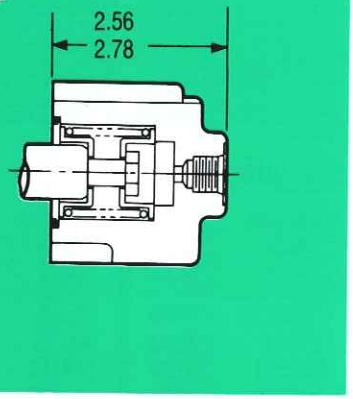
solenoid operated

End cap mounted solenoids with equal area pistons utilize a 300 psi pilot signal to shift the spool. Pilot supply connections are internal to the valve. The equal area solenoid pistons prevent ghosting. This operator can be adjusted to control the spool's rate of travel. Contact Commercial for solenoid applications.

oil hydraulic remote controller

Joystick type remote controllers provide precise control of two directional control valve sections. These units require 3-5 gpm pilot flow at up to 500 psi. Joystick models can be equiped with electrical switches and manual or electro-magnetic detents. Ask for catalog H-68R.

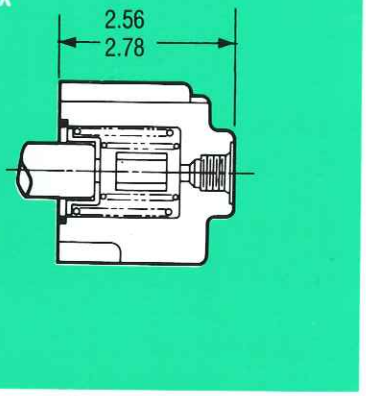
Code XP



pilot operated

This option uses a 100 psi pilot signal to shift the spool in either direction. As caps are required on both ends, manual actuation is not possible.

Code X



remote operated back cap

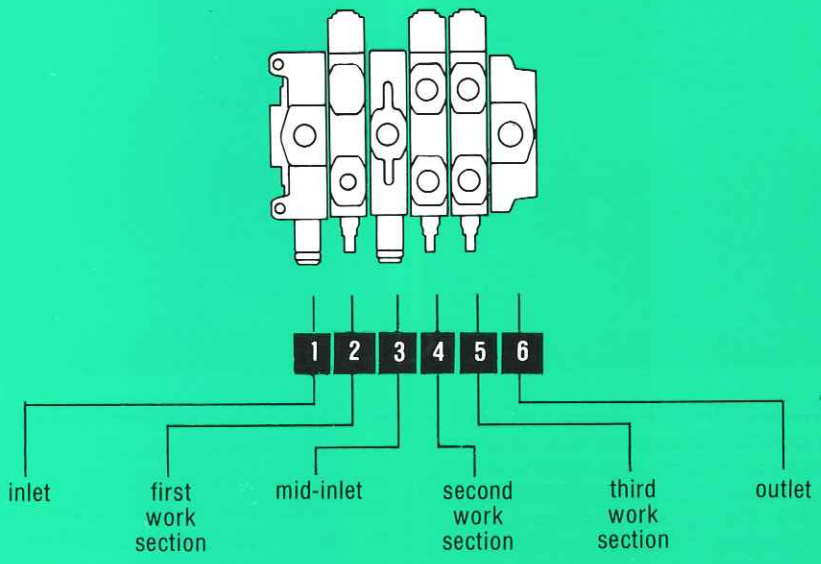
These sections may be matched with Commercial's oil hydraulic remote controllers for precisely metered remote valve control when manual operation is impractical. Pressure is bled from the main system or provided by an auxiliary circuit.

oil hydraulic remote controller

Single axis remote controllers operate one directional control valve section. They require 3-5 gpm pilot flow at up to 500 psi. Single axis models can be stacked in several configurations and are available with a foot pedal. Ask for catalog H-68.

how to code VA20/35-VG20/35 valves

A. Determine the system pressure and required flow through the valve and select the appropriate valve model.
B. Determine the number and order of sections required.
C. Specify the requirements for each of the sections — and select the appropriate codes for those requirements.
D. Assembled the code, specifying the model and then each section starting with the inlet and continue to the outlet.



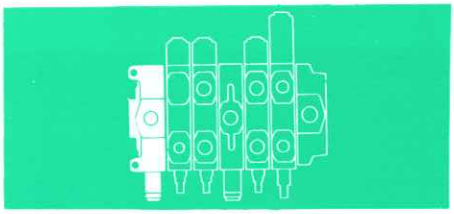
	section	requirements	code
	Model (page 17)	System pressure = 2000 psi — valve flow = 35 gpm	VA20
1	Inlet (pages 16 & 17)	Standard inlet with relief valve set at 2000 psi and — 16-SAE straight thread top ports	AA080 (2000)
2	First Work Section (pages 20 & 21)	Lo-Boy — double-acting cylinder, parallel circuit — spring return — 12-SAE straight thread ports	DA7
3	Mid-section Inlet (pages 18 & 19)	Combined flow type without a relief valve — 12-SAE straight thread port	CCA70
4	Second Work Section (pages 20 & 21)	Lo-Boy — double-acting motor, parallel circuit — spring return — 12-SAE straight thread port	MA7
5	Third Work Section (pages 20 & 21)	Lo-Boy — double-acting cylinder, parallel circuit — solenoid operated — 12-SAE straight thread port	DK7
6	Outlet Section (pages 24 & 25)	Return to tank type — 16-SAE straight thread top port	Z080

example of assembled valve ordering code

VA20-AA080 (2000) - DA7 - CCA70 - MA7 - DK7 - Z080

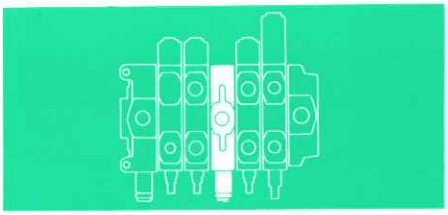
code cross reference

NOTE: These tables are provided as a cross reference for customers who have been using A-Line valves which are superceded by VA and VG model valves. Coding for VA and VG models differs from that for A-Line models.



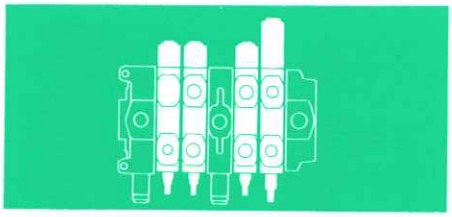
inlet sections

previous code A20	new code VA20	previous code A35	new code VA35
AA5	AA330	AA1	AA300
AA128	AA440	AA4	AA440
AA130	AA770	AA91	AA880
AA127	AA880	AA17	AA080
AA19	AA070	AA14	AA900
CA2	CA300	AA92	AA980
CA127	CA880	CA5	CA303
CA130	CA770	CA92	CA980



mid-inlet sections

previous code A20	new code VA20	previous code A35	new code VA35
EAA3	CAA30	EAA3	CAA40
EAA11	CAA70	EAA14	CAA80
EAA110	SAA70	EAA103	SAA40
EAA123	SAA33	EAA112	SAA80
ECA11	CCA70	EAA125	SAA44
ECA103	SCA30	EAA141	SAA88
		ECA3	CCA40
		ECA14	CCA80



working sections

previous code A20	new code VA20
DA52	DA2
DA53	DA3
DA55	DA5
DA56	DA6
DA57	DA7
DB52	DB2
DB53	DB3
DB55	DB5
DB57	DB7
DC53	DC3
DS3	DS3
4DS3	DR3
DS7	DS7
2DS7	DR7
FB53	FB3
FB57	FB7
FC53	FC3
FC57	FC7
GC57	—
GC170	—
GC257	—
GC657	—
HA52	HA200
HA53	HA300
HA56	HA600
HA57	HA700
HA120	HA733
HA165	HA233
HA166	HA333
HA168	HA533
HA169	HA633
HA170	HA733
2HA177	HA230
HA178	HA330
HA181	HA630
HA182	HA730
HA190	HA303
1HA193	HA603
HA194	HA703
HA266	HA322
HA270	HA722
HA282	HA720
HA653	HA344
HA656	HA644
HA657	HA744
HB53	HB300
HB56	HB600
HB57	HB700
HB166	HB333

previous code A20	new code VA20
HB168	HB533
HB170	HB733
HB178	HB330
HB190	HB303
HB194	HB703
HB653	HB344
HB657	HB744
HC53	HC300
HS3	HS300
2HS3	HR300
HS7	HS700
HS116	HS333
HS120	HS733
3HS120	HR733
HS128	HS330
1HS220	HR722
HS603	HS344
3HS603	HR344
HS607	HS744
JA57	JA700
JA190	JA303
JB52	JB200
JB53	JB300
JB190	JB303
JB194	JB703
JC190	JC303
JC194	JC703
JS3	JS300
JS140	JS303
JS144	JS703
KA180	KA530
KB180	KB530
KC55	KC500
KC180	KC530
LA52	LA200
LA53	LA300
LA56	LA600
LA57	LA700
LA168	LA533
LA190	LA303
1LA269	LA622
1LA270	LA722
LA653	LA344
LA656	LA644
LA657	LA744
LB53	LB300
LB55	LB500
LB56	LB600
LB57	LB700

previous code A20	new code VA20
LB168	LB533
LS3	LS300
LS7	LS700
1LS607	LR744
MA52	MA2
MA53	MA3
MA57	MA7
MB52	MB2
MB53	MB3
MB57	MB7
MC53	MC3
ME57	ME7
MS3	MS3
MS7	MS7
NA53	NA3
NB53	NB3
NB57	NB7
SA52	SA2
SA53	SA3
SA55	SA5

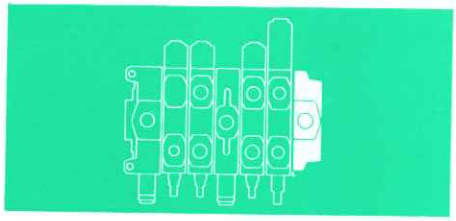
previous code A35	new code VA35
DA51	DA2
DA52	DA3
DA53	DA4
DA56	DA6
DA57	DA7
DA59	DA8
DA63	DA5
DB52	DB3
DB53	DB4
DB57	DB7
DB59	DB8
DB63	DB5
DS3	DS4
1DS3	DR4
DS9	DS8
2DS9	DR8
FC53	—
FC59	—
GC166	GC411
GC172	GC811
GC266	GC422
GC472	GC811
HA53	HA400
HA57	HA700
1HA57	HA700
HA59	HA800
HA159	HA832
HA166	HA433
HA170	HA733
HA172	HA833
HA178	HA430
HA182	HA730
1HA182	HA730

previous code A20	new code VA20
SA57	SA7
SA59	SA9
SB53	SB3
SB57	SB7
SC53	SC3
TA52	TA2
TA53	TA3
TA57	TA7
TA59	TA9
WDA53	WDA3
WDA55	WDA5
WDA57	WDA7
WDB53	WDB3
WDB57	WDB7
WMA53	WMA3
WMA57	WMA7
WMB53	WMB3
WMB57	WMB7
WME57	WME7

previous code A35	new code VA35
HA190	HA403
2HA190	HA409
HA194	HA703
1HA194	HA703
HA196	HA803
HA266	HA422
HA272	HA822
HA284	HA820
HA472	HA811
HA653	HA444
HA659	HA844
HB166	HB433
*HB172	HB833
HB178	HB430
HB184	HB830
HB190	HB403
HB484	HB810
HB653	HB444
HB659	HB844
HS9	HS800
1HS9	HR800
HS116	HS433
HS122	HS833
1HS122	HR833
HS422	HR811
HS603	HS444
1HS609	HR844
LA53	LA400
LA57	LA700
LA59	LA800
1LA166	LA499
LA170	LA733
LA172	LA833

previous code A35	new code VA35
1LA178	LA490
LA196	LA803
LA659	LA844
LB53	LB400
LB172	LB833
1LS9	LR800
MA53	MA4
MA57	MA7
MA59	MA8
1MA59	MA8
MB53	MB4
MB59	MB8
ME59	ME8
MS3	MS4
3MS3	MR4

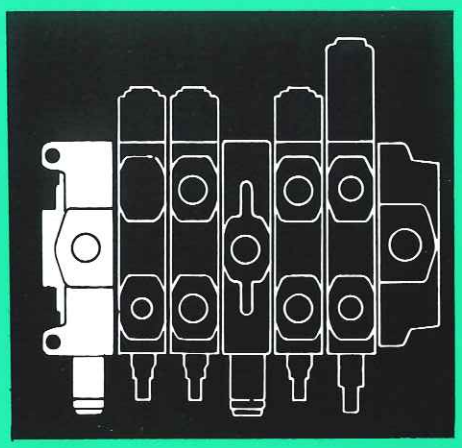
previous code A35	new code VA35
MS9	MS8
WDA52	WDA3
WDA53	WDA4
WDA59	WDA8
WDB53	WDB4
WDS9	WDS8
1WDS9	WDR8
1WHS7	WHR700
1WHS120	WHR711
WMA53	WMA4
WMA59	WMA8
WMB53	WMB4
WMB59	WMB8
WMS9	WMS8
1WMS9	WMR8



outlet sections

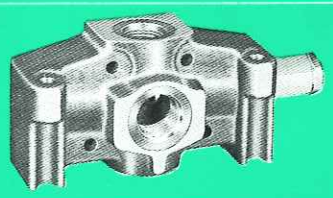
previous code A20	new code VA20
AY606	AY40040
CY658	CY80080
DY606	DY40040
Z2	Z400
Z3	Z330
Z11	Z070
Z14	Z880
Z16	Z440
Z18	Z870
1ZT4	ZT040
Y4	Y30030
Y6	Y40040
Y12	Y24024
Y82	Y28028
Y164	Y80028
Y182	Y44044

previous code A35	new code VA35
AY663	AY90090
CY663	CY90090
DY663	DY90090
Z3	Z040
Z16	Z550
Z20	Z880
Z10	Z900
Z17	Z990
Z15	Z980
ZT17	ZT990
Y63	Y90090
Y12	Y35035
Y89	Y39039
Y180	Y90039



inlet sections

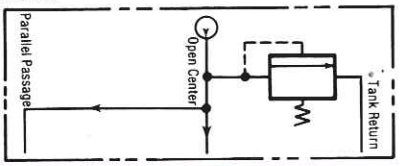
standard type



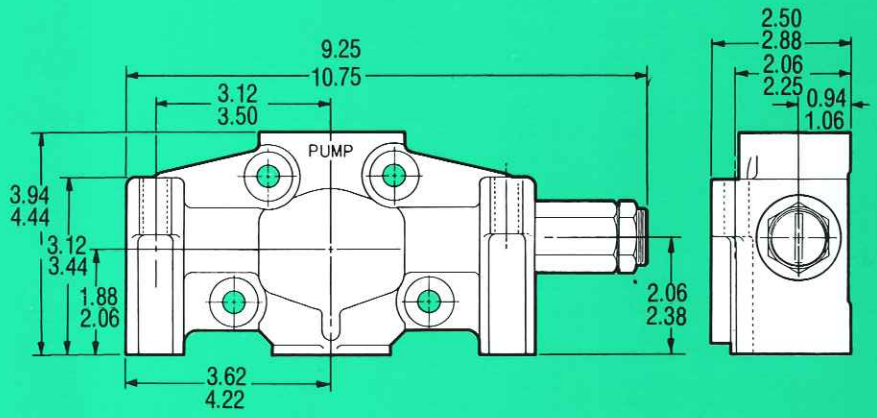
bottom dump to tank type

typical schematic

Code AA



dimensional data, inches VA20/VG20 / VA35/VG35



A A — function

code	description
** AA	— standard inlet with screw adjusted relief valve
CA	— standard inlet without screw adjusted relief valve, cavity plugged

7 — high pressure port, side

7 — high pressure port, top

0 — low pressure port bottom

porting

description	VA20 code	VA35 code	VG20 code	VG35 code
no port	0	0	0	0
¾" split flange	1	1	1	1
½" NPT **	2	...	...	...
¾" NPT **	3	3	...	...
1" NPT **	4	4	...	...
1" split flange	...	5	...	5
SAE-10	6	...	6	...
SAE-12	7	7	7	7
SAE-16	8	8	8	8
SAE-20	...	9	...	9

**NOTE: NPT ports are not available for VG models.

example of coding for inlet sections

VA20 -A A 7 7 0 (2000)

AA — standard inlet with screw adjusted relief valve
7 — SAE-12 high pressure port, side
7 — SAE-12 high pressure port, top
0 — no port, bottom

VA35 -C A 0 3 3

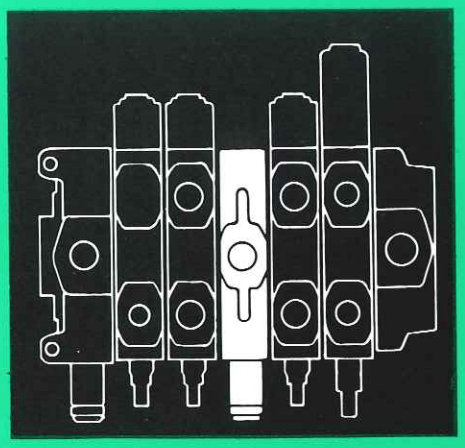
CA — standard inlet without screw adjusted relief valve, cavity plugged
0 — no port, side
3 — ¾" NPT high pressure port, top
3 — ¾" NPT low pressure port, bottom

**NOTE: When ordering inlets please identify pressure and flow for main relief valve setting, see example above.

SAE J846 tube coding system

Nominal Tube O.D., in	Dash Size Symbol
½	-8
⅝	-10
¾	-12
⅞	-14
1	-16
1¼	-20

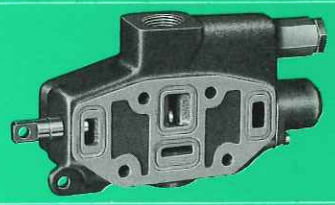
Codes in blue panels are standard and are readily available from stock.



mid-inlet sections

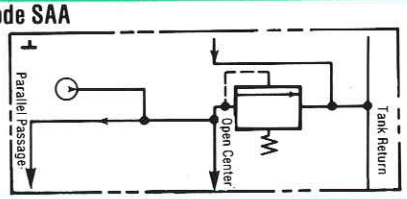
split flow type – combined flow type

split or combined flow type (manual operation)

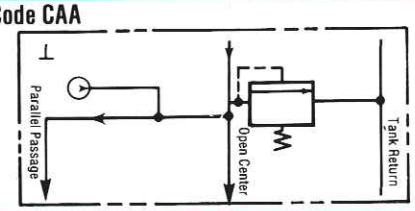


typical schematic

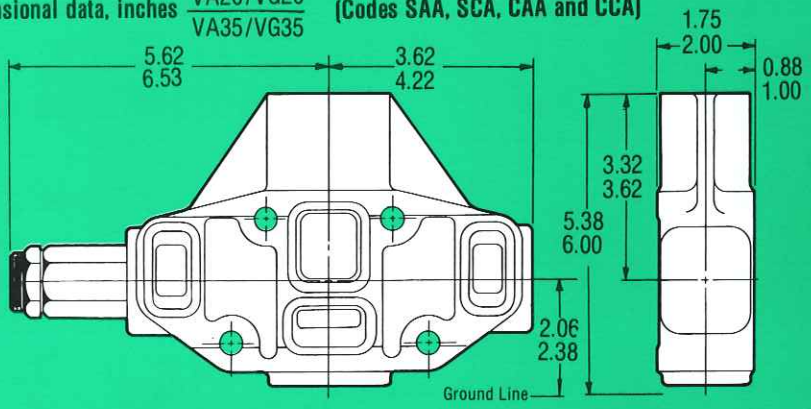
Code SAA



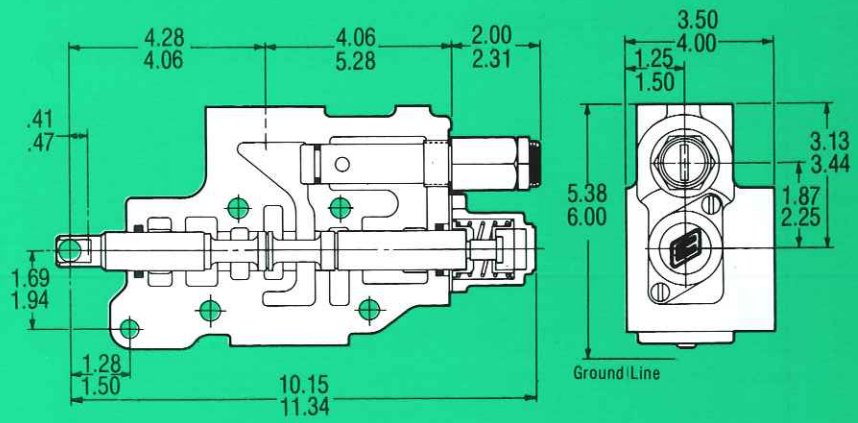
Code CAA

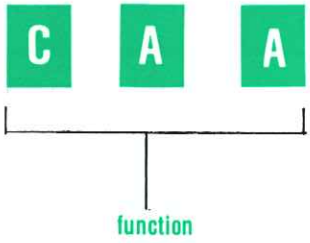


dimensional data, inches $\frac{\text{VA20/VG20}}{\text{VA35/VG35}}$ **(Codes SAA, SCA, CAA and CCA)**



dimensional data, inches $\frac{\text{VA20/VG20}}{\text{VA35/VG35}}$ **(Codes XCA and XAA)**





code	description
* SAA	— split flow with relief valve
SCA	— split flow without relief valve
* CAA	— combined flow with relief valve
CCA	— combined flow without relief valve
* XAA	— selector with relief valve
XCA	— selector without relief valve

porting

description	VA20 code	VA35 code	VG20 code	VG35 code
no port	0	0	0	0
¾" split flange	...	1	...	1
½" NPT **	2	...	2	...
¾" NPT **	3	3	3	3
1" NPT **	...	4	...	4
SAE-8	5	...	5	...
SAE-10	6	6	6	6
SAE-12	7	7	7	7
SAE-16	...	8	...	8

**NOTE: NPT ports are not available for VG models.

example of coding for mid-inlet sections

VA20 - C A A 7 0 (2000)

CAA — combined flow with relief valve
7 — SAE-12 high pressure port, top
0 — no port, rear

VA20 - S A A 8 8 (1500)

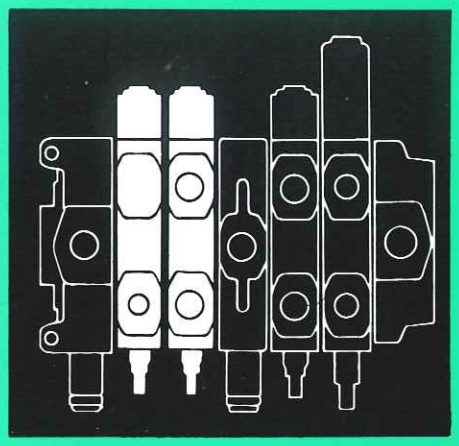
SAA — split flow with relief valve
8 — SAE-16 high pressure port, top
8 — SAE-16 low pressure port, rear

*NOTE: When ordering mid-inlets please identify relief valve pressure and flow requirements, see example above.

SAE J846 tube coding system

Nominal Tube O.D., in	Dash Size Symbol
½	-8
⅝	-10
¾	-12
⅞	-14
1	-16
1¼	-20

■ Codes in blue panels are standard and are readily available from stock.

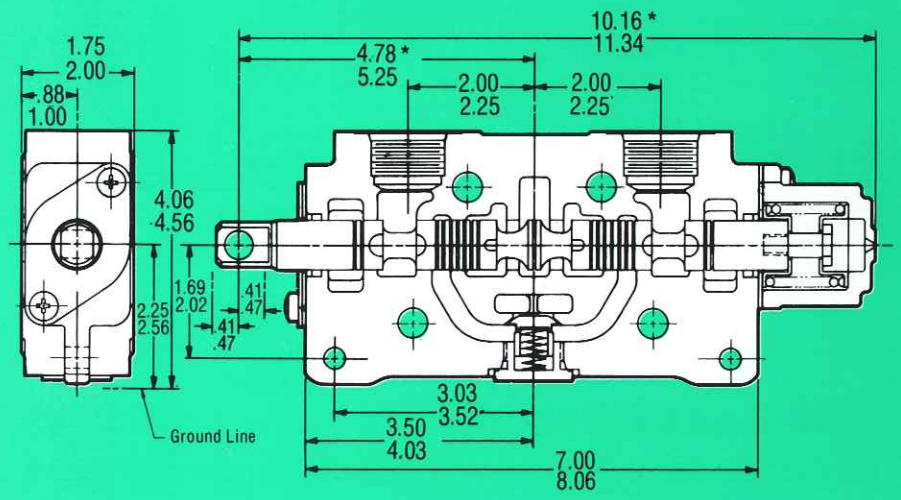


LO-BOY working sections

manual operation

pilot operated

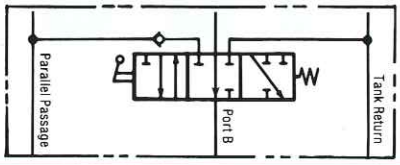
dimensional data, inches VA20/VG20 / VA35/VG35



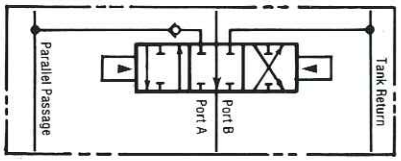
* These dimensions are shown for a manually operated valve with spring return. See operators pages 12 and 13 for other combinations.

typical schematic

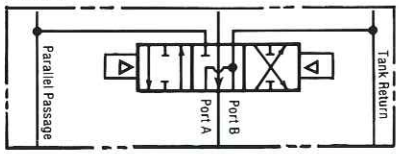
Code SA



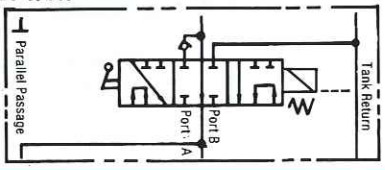
Code DR



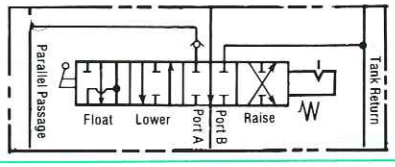
Code MS

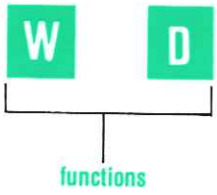


Code WDK



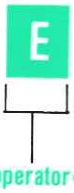
Code FC





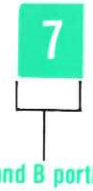
code	description
D	— double-acting, parallel, cylinder
M	— double-acting, parallel, motor
WD	— double-acting, series, cylinder
WM	— double-acting, series, motor
S	— single-acting, (B port), parallel, cylinder
N	— single-acting, (B port), parallel, motor
T	— single-acting, (A port), parallel, cylinder
F	— double-acting, with 4th position

*dimensional data shown does not apply to this section



	description	
A	spring return	E
B	3-position detent	F
C	spring return with 4th position detent	N/A
XP	pilot operated	XP
X	hydraulic remote	X
K	solenoid	L
Q	electro-magnetic detent	M
P	remote w/solenoid lockout	P
V	single ended pneumatic	U

• see pages 12 and 13 for operator dimensional data



description	VA20 code	VA35 code	VG20 code	VG35 code
¾ split flange		1		1
½ NPT**	2			
¾ NPT**	3	3		
1 NPT**		4		
SAE-8	5	5	5	5
SAE-10	6	6	6	6
SAE-12	7	7	7	7
SAE-16	8*	8	8*	8
SAE-20		9*		9*

*these ports restricted to 60% of PSI —
VA 1500 psi
VG 2100 psi
**NPT ports not available on VG models

example of coding LO-BOY working sections:

VA20 - WDE-7

WD — double-acting, series, cylinder type
E — spring return operator at A port end
7 — SAE-12

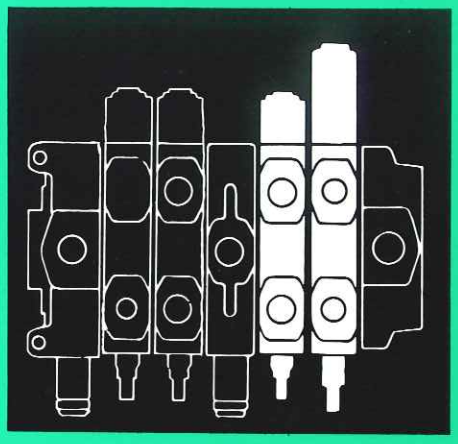
VA35 - M B 8

M — double-acting, parallel, motor
B — 3-position detent operator
8 — SAE-16 A and B ports

SAE J846 tube coding system

Nominal Tube O.D., in	Dash Size Symbol
½	-8
⅝	-10
¾	-12
⅞	-14
1	-16
1¼	-20

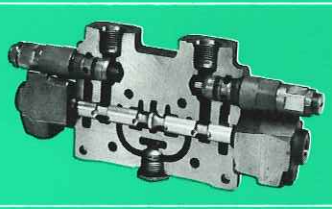
Codes in blue panels are standard and are readily available from stock.



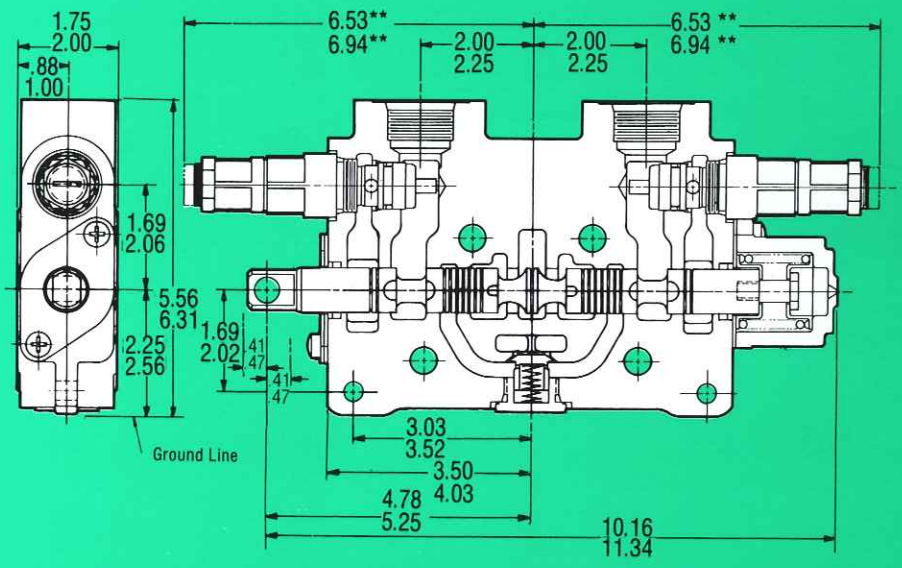
HI-BOY Working Sections

manual operation

pilot operated



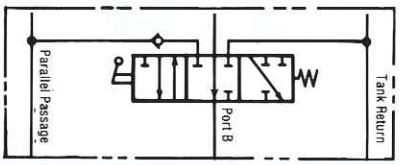
dimensional data, inches VA20/VG20 / VA35/VG35



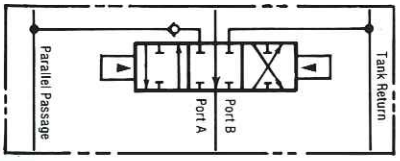
**maximum dimensions shown with adjustable screw backed out as far as normally expected.

typical schematic

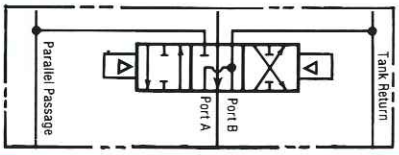
Code JA



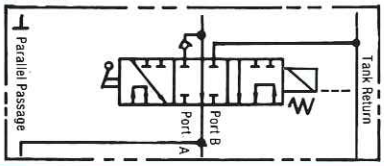
Code HR



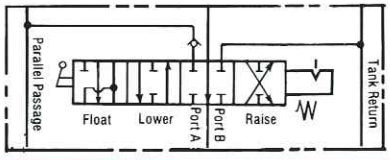
Code LS



Code WHK



Code GC



functions

code	description
H	– double-acting, parallel, cylinder
L	– double-acting, parallel, motor
WH	– double-acting, series, cylinder
WL	– double-acting, series, motor
J	– single-acting, (B port), parallel, cylinder
G	– double-acting, with 4th position parallel, float*
K	– single-acting, (A port), parallel, cylinder
R	—regeneration hi-boy, VA35 only. *dimensional data shown does not apply to this section

operator•

left hand assembly operator is at B port end		right hand assembly operator is at A port end
code	description	code
A	..spring return	E
B	...3-position detent	F
C	...spring return with 4th position detent	N/A
XP	..pilot operated	XP
X	...hydraulic remote	X
K	...solenoid	L
Q	...electro-magnetic	M
P	...remote w/solenoid .... lockout	P
V	...single ended pneumatic	U

• see pages 12 and 13 for operator dimensional data

A and B porting

VA20/ VG20 code	description	VA35/ VG35 code
	...¾ split flange .	1
2	.½ NPT**	
3	.¾ NPT**	3
	...1 NPT**	4
5	.SAE-8	5
6	.SAE-10	6
7	.SAE-12	7
8*	.SAE-16	8
	...SAE-20	9*

*these ports restricted to 60% of PSI— VA 1500 psi VG 2100 psi

**NPT ports not available on VG models

accessory valve

port A

code	description
0	...not machined
1	...relief valve and anti-cavitation
2	...anti-cavitation
3	..relief valve
4	...crossover relief
9	...plugged

accessory valve

port B

code	description
0	...not machined
1	...relief valve and anti-cavitation
2	...anti-cavitation
3	..relief valve
4	...crossover relief
9	...plugged

NOTE: When specifying circuit relief valves please specify relief valve settings, see examples below.

example of coding HI-BOY working sections:

VA20 -L X-7 4 4 (1000/1000)

- L — double-acting, parallel, motor
- X — hydraulic remote operator
- 7 — SAE-12 A and B porting
- 4 — crossover relief in port A (1000)
- 4 — crossover relief in port B (1000)

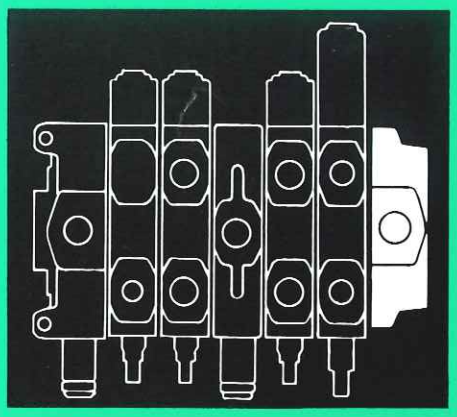
VA20 -H A-6 1 1 (1500/2000)

- H — double-acting, parallel, cylinder
- A — spring return operation
- 6 — SAE-10 A and B porting
- 1 — relief valve and anti-cavitation in port A (1500)
- 1 — relief valve and anti-cavitation in port B (2000)

SAE J846 tube coding system

Nominal Tube O.D., in	Dash Size Symbol
½	-8
⅝	-10
¾	-12
⅞	-14
1	-16
1¼	-20

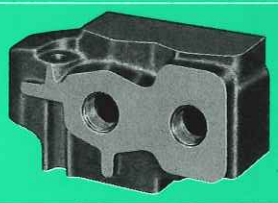
Codes in blue panels are standard and are readily available from stock.



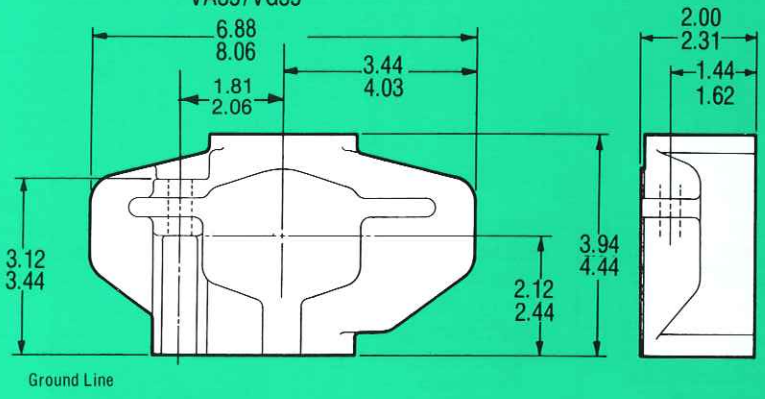
outlet sections

tank return type

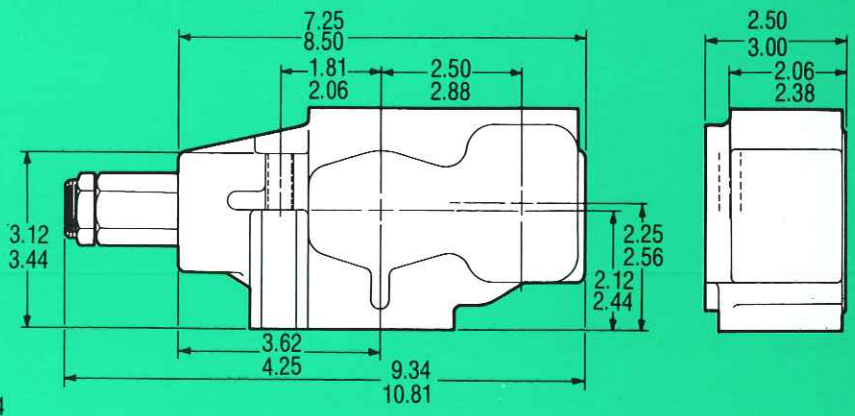
pressure beyond or tank return type (convertible)



dimensional data, inches VA20/VG20 / VA35/VG35 **(Code Z)**

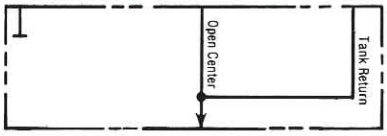


dimensional data, inches VA20/VG20 / VA35/VG35 **(Codes DY, CY and AY)**

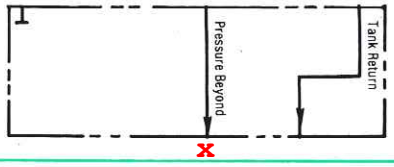


typical schematic

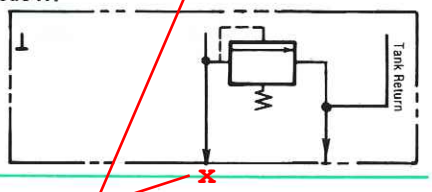
Code Z



Code Y



Code AY

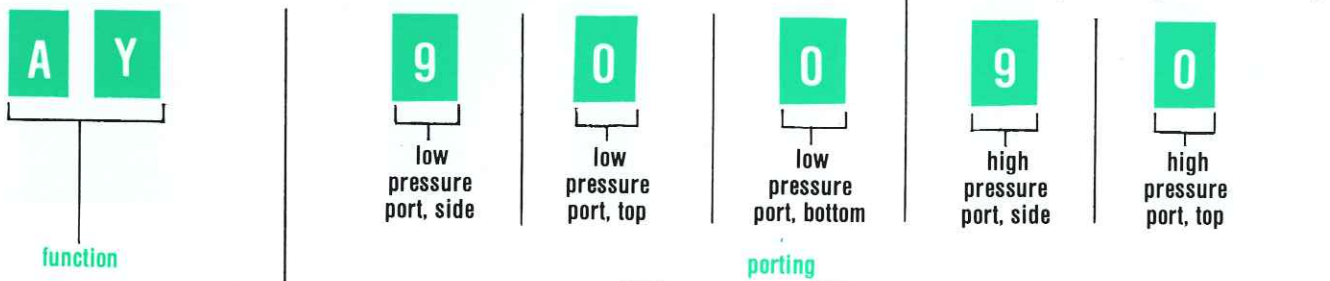


X

plug this port for closed center

NOTE: Dimensions do not necessarily apply to all types of thru stud outlets.

Applicable to power beyond valves only.



code	description
Z	— standard low pressure outlet
ZT*	— thru stud low pressure outlet
Y	— standard pressure beyond outlet
YT*	— thru stud power beyond outlet
DY	— convertible type; short plug for low pressure at all ports
CY	— convertible type; long plug for pressure beyond; no relief valve
*** AY	— convertible type with pressure beyond and with relief valve

*thru stud outlets must be used with VG assemblies.

description	VA20 code	VA35 code	VG20 code	VG35 code
no port	0	0	0	0
¾" split flange	1**	...	1**	...
½" NPT	2	...	...	...
¾" NPT	3	3	...	...
1" NPT	4	4	....	...
1¼" NPT	...	.5**	...	...
SAE-10	6	...	6	...
SAE-12	7	7	7	7
SAE-16	8	8	8	8
SAE-20	...	9	...	.9

**cannot be used with bottom dump porting.

NOTE: NPT ports are not available for VG models.

A Y 9 0 0 9 0 (1500)

- AY — convertible type with pressure beyond and with relief valve(1500)
- 9 — SAE-20 low pressure port, side
- 0 — no port, top
- 0 — no port, bottom
- 9 — SAE-20 high pressure port, side
- 0 — no port, top

example of coding for outlet sections

Z 8 8 0

- Z — standard low pressure outlet
- 8 — SAE-16 low pressure port, side
- 8 — SAE-16 low pressure port, top
- 0 — no port, bottom

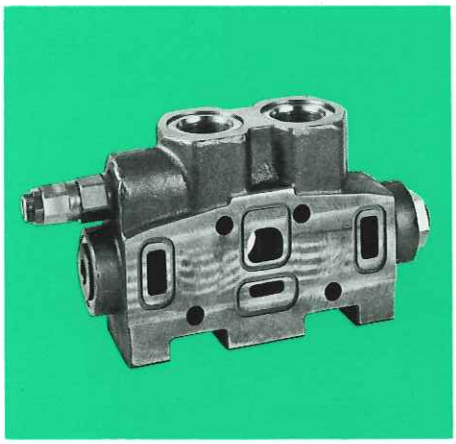
SAE J846 tube coding system

Nominal Tube O.D., in	Dash Size Symbol
½	-8
⅝	-10
¾	-12
⅞	-14
1	-16
1¼	-20

***NOTE: When ordering power beyond outlets with relief valves please specify relief valve flow and pressure, see example above.

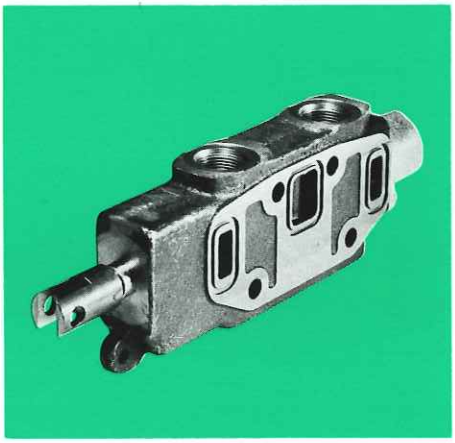
Codes in blue panels are standard and are readily available from stock.

accessories and other valve products



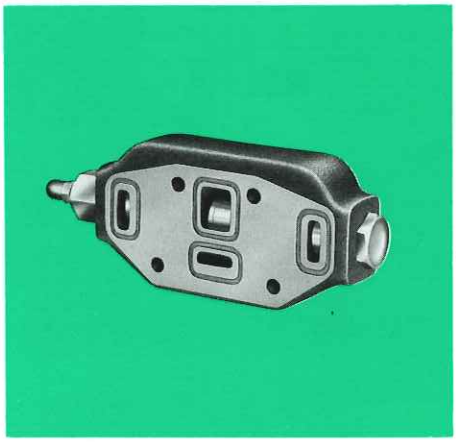
VA/VG inlet unloader

An optional inlet unloader improves high flow performance of VA/VG20 and 35 valves by diverting pump flow directly to tank until a work spool is actuated. This makes it unnecessary to disengage the pump during roading and allows a smaller more economical control valve to be used.



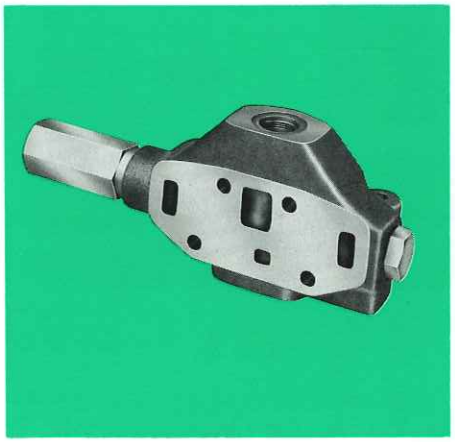
automatic kickout valve

Automatic kickout sections are detented in a work position by the operator. When pressure at the work port reaches a pre-set level, pilot flow from the port releases the detent mechanism and the spool is spring-returned to neutral. Highboy versions are also available.



flow control section

This section maintains constant flow to all downstream sections by metering flow through a fixed orifice. Six orifice sizes for flows from 3 gpm to 16 gpm are offered.



pressure compensating outlet (VA/VG models)

This outlet automatically meters flow through work ports of any upstream parallel section. It may be used in a mixed circuit bank if all series sections are upstream of the parallel sections.