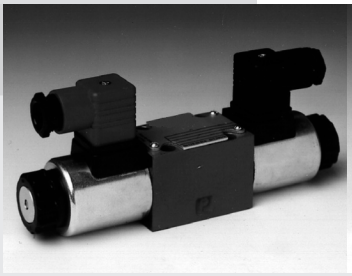
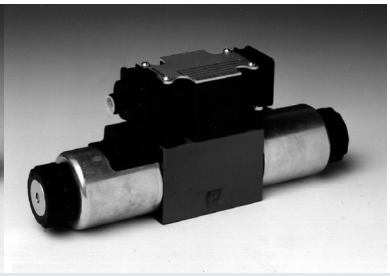
4/2 and 4/3-Way Proportional Directional Control Valve Direct Operated

RA 29057/06.98 **1**/8
Replaces: 06.94

Model 4 WRA(E)B



Model 4 WRA B 6..-1X/.. Z45



Model 4 WRA E B 6..-X/.. DK26

Size 6
Series 1X
Maximum operating pressure 350 bar (5100 PSI)
Maximum Flow 30 L/min (7.9 GPM)

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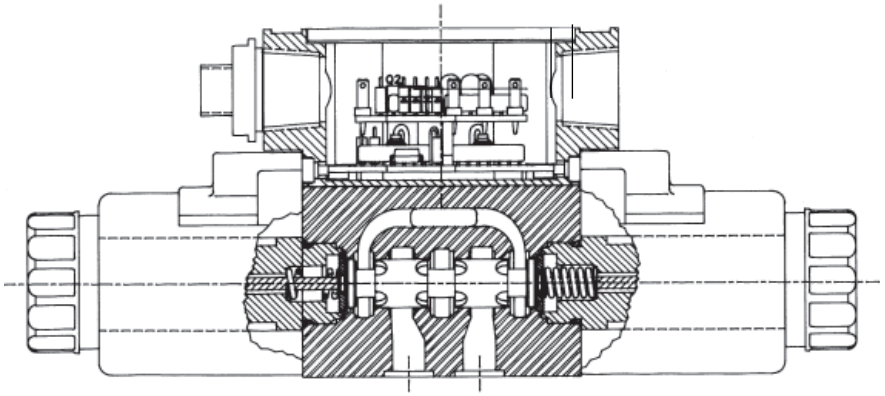
Features

- Direct operated proportional directional control valves, which control both the direction and volume of a fluid flow
- Mounts on standard ISO 4401-3, NFPA T3.5.1MR1 D 03 and ANSI B 93.7 D 03 interface
- Two piece solenoid design with removable coils
- Integrated electronics available
- For subplates, see RE 45 052

Functional Description



Proportional directional control valves Model 4 WRA B 6 and 4 WRAE B 6 are direct operated spool valves. They control the direction and quantity of flow to an actuator, for smooth acceleration to a desired velocity. The valve is normally operated by integrated electronics or a suitable amplifier. The 4 WRA B can be operated as a switching valve if proportional control is not required.

These valves consist of a housing, control spool, springs, and proportional solenoids. Solenoid current increases the magnetic force to push the armature and spool against an opposing spring. The spool position is proportional to this force balance. Large spool notches meter fluid in and out of the actuator (P to B, A to T). Flow rate is based upon the notch size, spool position and pressure drop across the resulting throttle. Maximum flow is restricted by the power limit of the valve.

Covered manual overrides (N9) are standard to simplify troubleshooting. A recessed pin push is used to move the spool.

Coils can be replaced by removing a hand tightened ring. A molded central (D) box is available to mate with integral solenoid pins for uncomplicated installation and servicing. Electrical connections can be compression terminals in the box with 1/2" NPT conduit connections (DA). A 5-pin connector is available (DK25) to mate with molded cables per ANSI B93.55 M. Cable is not included. The DK25 is used for single solenoid valves (EA, WA use pins 2, 3, 4) and two solenoid valves. Individual connectors (Z45) are also available when a (D) box is not requested.

Integrated electronics requires a 6-pin connector (DK26). Mating plug/cable is not included. A shielded cable is recommended. Supply voltage must be 21V to 35V (G24) for integrated electronics. The 4 WRA E B 6 must be coded /G24, although it has a 12 volt coil.

Ordering Code

4	WRA		B	6		-1X /	N9			*

4-way = **4**

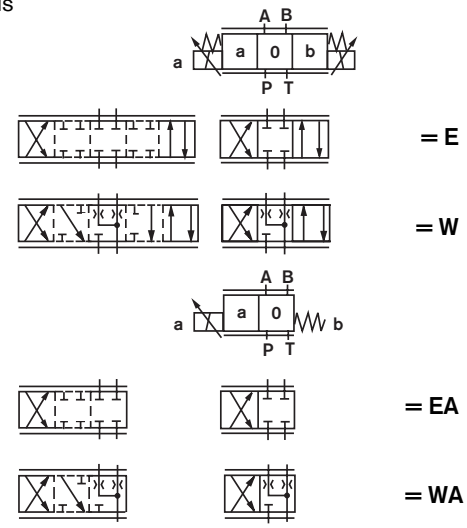
Proportional directional control valve, direct operated = **WRA**

Integrated electronics = **E**
(Must use 24V power supply)

Valve with removable coil = **B**

Size 6 ISO 4401 NFPA/ANSI D 03 = **6**

Symbols



= **E**

= **W**

= **EA**

= **WA**

Nominal flow at 145 psi (10 bar) pressure drop
12 L/min (3.2 GPM) = **12**
25 L/min (6.6 GPM) = **25**

1X = Series 10 to 19
(10 to 19 externally interchangeable)

G12 = (without integrated electronics) solenoid voltage 12 VDC - Note 1*

G24 = (without integrated electronics) solenoid voltage 24 VDC - Note 2*

G24 = (integrated electronics) power supply voltage 24 VDC - Note 3*

N9 = Covered manual override

Individual solenoid plug connections

K4 = Without angled plug connector(s)

Plug-pin type connectors (without mating connector)

DK25 = Terminal box with 5-pin connector

DK26 = Integrated electronics terminal box with 6-pin connector

Central solenoid connections

DA = Terminal box for 1/2" NPT conduit

MR = Buna-N (NBR) seats suitable for petroleum oils (HM, HL, HLP)

VR = Fluorocarbon (FPM) seals suitable for phosphate ester fluids (HFD-R)

Further details to be written in clear text

* See Notes, page 4

Technical Data (for applications outside these parameters, please consult us)

General

Weight (approx.)	-valve with 1 solenoid	kg (lbs)	1.6 (3.5)	
	-valve with 2 solenoids	kg (lbs)	2.1 (4.6)	
Mounting position			Optional	
Ambient temperature range		°C (°F)	to 50 (+122)	

Hydraulic

Valve Model			**4 WRA B 6**	**4 WRAE B 6**
Operating pressure	-ports A, B, P	bar (PSI)	350 (5075)	
	-port T	bar (PSI)	210 (3045)	
Recommended maximum pressure drop		bar (PSI)	< 210 (3045)	
Maximum flow		L/min (GPM)	7.9 (30)	
Hydraulic fluid			Petroleum oils (HM, HL, HLP)	
			Phosphate ester fluids (HFD-R)	
Fluid temperature range	- NBR	°C (°F)	-30 to 80 (-22 to 176)	
	- FPM	°C (°F)	-20 to 80 (-4 to 176)	
Viscosity range		mm ²/s (SUS)	2.8 to 500 (35 to 2320)	
Maximum allowable fluid cleanliness - Class 16/13 to 18/15 according to ISO 4406. Therefore, we recommend a filter with a minimum retention rate of $\beta_{10} \geq 75$				
Hysteresis		%	< 3.5	
Repeatability		%	< 1	
Sensitivity		%	< 1	
Frequency response (-3 dB, signal ± 50%)		Hz	24	
Switching time to, or	ON or 0 - 100%	ms	18	30
Step response	OFF or 100% - 0	ms	20	40

Electrical

Valve Model			**4 WRA B 6**		**4 WRAE B 6**
Supply voltage		vdc	12V	24V	21 to 35V
			(± 10%)	(± 10%)	
Maximum current (at 24 vdc)		amps	2.5	1.25	1.1
Maximum power		W	30	30	23
Solenoid coil resistance,	cold value 68 °F (20 °C)	Ω	4.8	19.2	4.8
	warm value 122 °F (50 °C)	Ω	7.2	28.8	7.2
Inductance		mH	86	339	86
Duty cycle			Continuous		
Coil temperature range		°C (°F)	to 150 (+302)		
Electrical	Z45 - 3 prong plug and socket to ANSI/B93.94M,				
connections	DIN 43650 for 1/2" conduit or 6-14 mm cable ϕ		Z45		–
	Screw connection in resin box for 1/2" conduit		DA		–
	5-pin male receptacle (without mating plug)		DK25		–
	6-pin male receptacle (without mating plug)		–		DK26
Insulation			IP65, exceeds NEMA class B		
Analog input	(Re > 10 k-Ω)	vdc	–		0 to ±10V
Associated electronic amplifier cards (some restrictions apply)			MDSD note 1	Not avail. note 2	Included

Note 1) The MDSD1 or MDSD will operate the 4 WRA B../G12 with 14 to 28 vdc from the power supply. The MDSD can be used with 10 to 14 vdc power, but valve performance may be affected. At higher temperatures, increased solenoid resistance may reduce the available flow. An amplifier is not required when using the 4 WRA B../G12 as a non-proportional (switching) valve at 12 vdc ±10%.

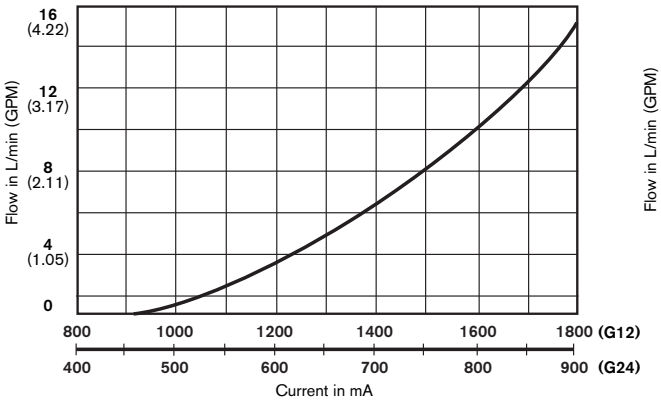
Note 2) The MDSD is not preferred for the 4 WRA B../G24, since this would require 27 to 28 vdc from the power supply. At 24 vdc and maximum coil temperature, the MDSD would only provide about 85% of full flow. An amplifier is not required when using the 4 WRA B../G24 as a non-proportional (switching) valve at 24 vdc ±10%.

Note 3) The 4 WRAE B (integrated electronics) will have the ../G24 designation indicating supply voltage for the amplifier. The solenoid coil will have 12 volt specifications.

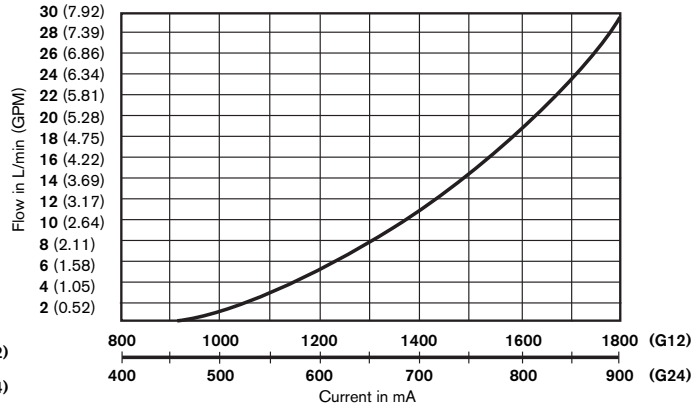
Performance Curves – measured at ν = 190 SUS (41 mm²/s) and t = 122 °F (50 °C)

Flow at 145 psi (10 bar) ΔP

4WRAB6E12-1X

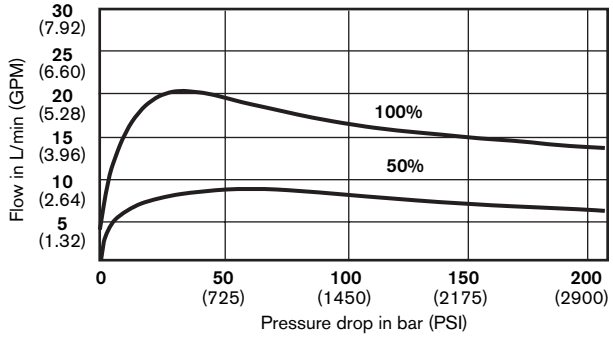


4WRAB6E25-1X

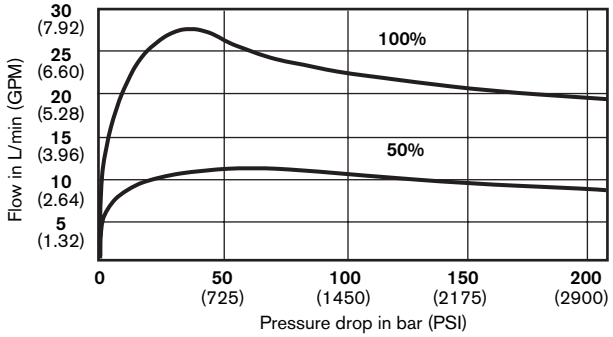


Power Limit

4WRAB6E12-1X

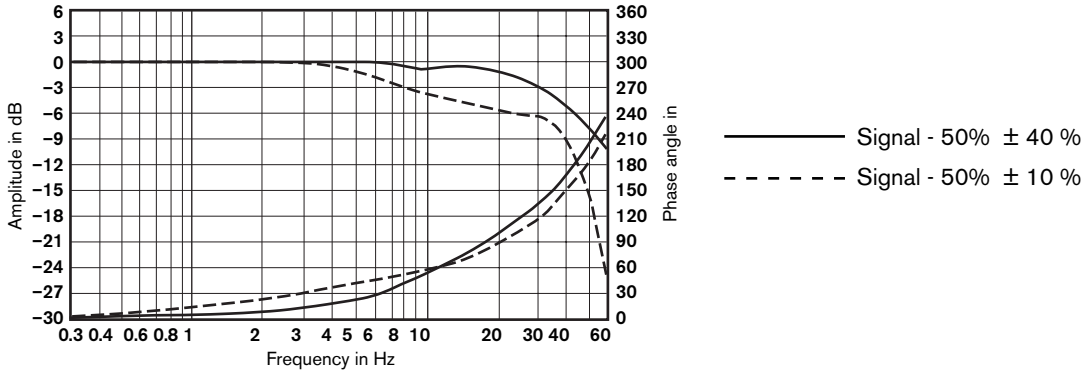


4WRAB6E25-1X



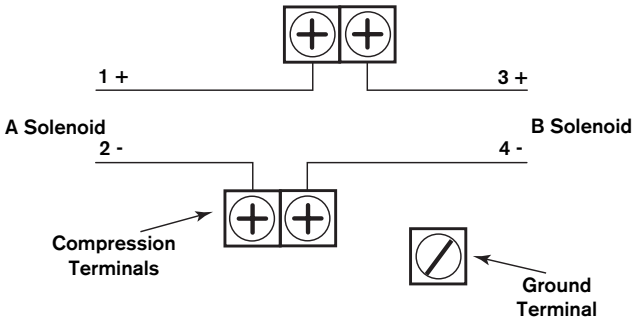
Frequency Response

Model 4 WRA(E) B 6...

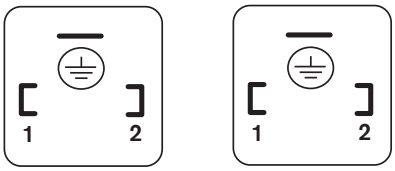


Electrical Connections

DA (non integrated)

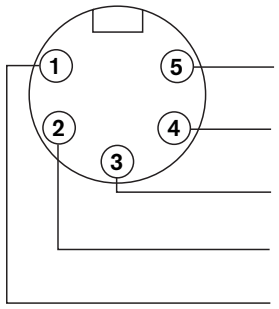


K4



Coil connected to pins 1 and 2

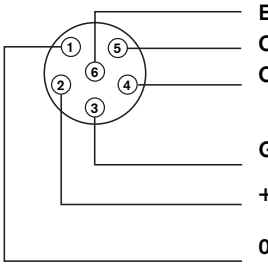
DK25



A Solenoid	5 - black
B Solenoid	4 - orange
Protective Ground	3 - green
B Solenoid	2 - red
A Solenoid	1 - white

DK25 mates with ANSI/B93.55M molded male connectors
0.875-16 UN-2A Coupling Thread
For single solenoid, use 2, 3, 4

DK26

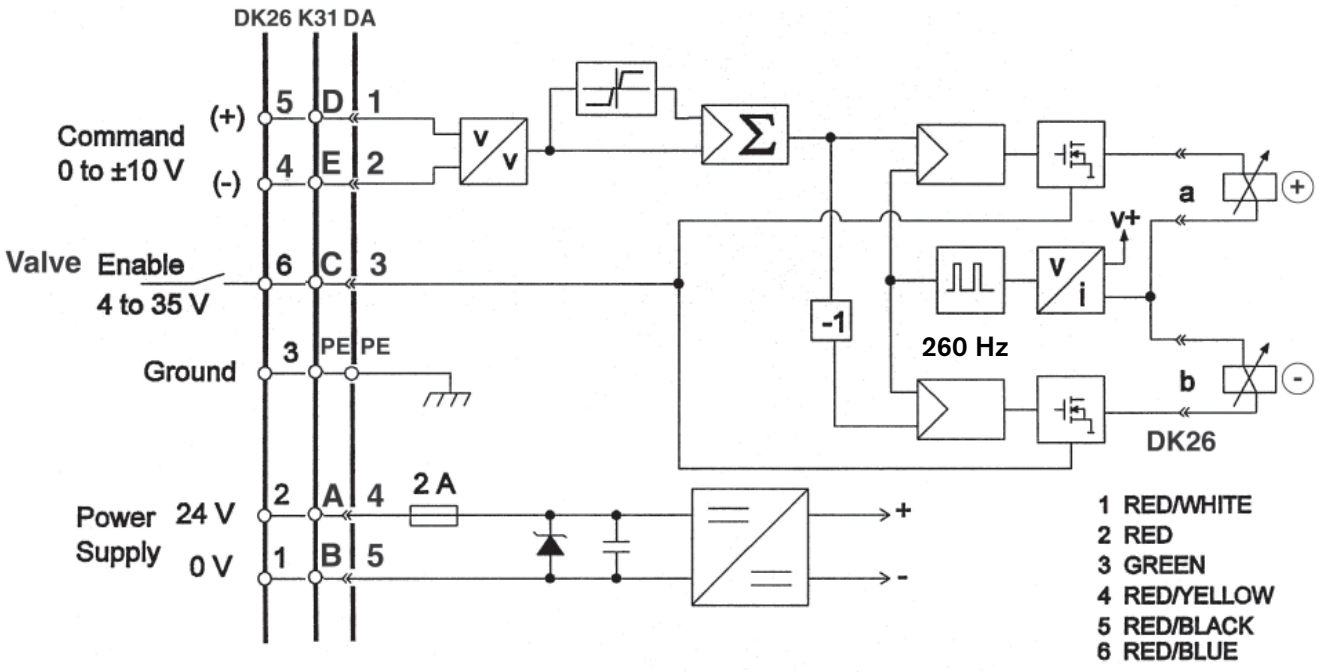


Enable	6 - red-blue tr.
Command (-)	5 - red-black tr.
Command (+)	4 - red-yellow tr.
Ground	3 - green
+24V Power	2 - red
0V Power	1 - red-white tr.

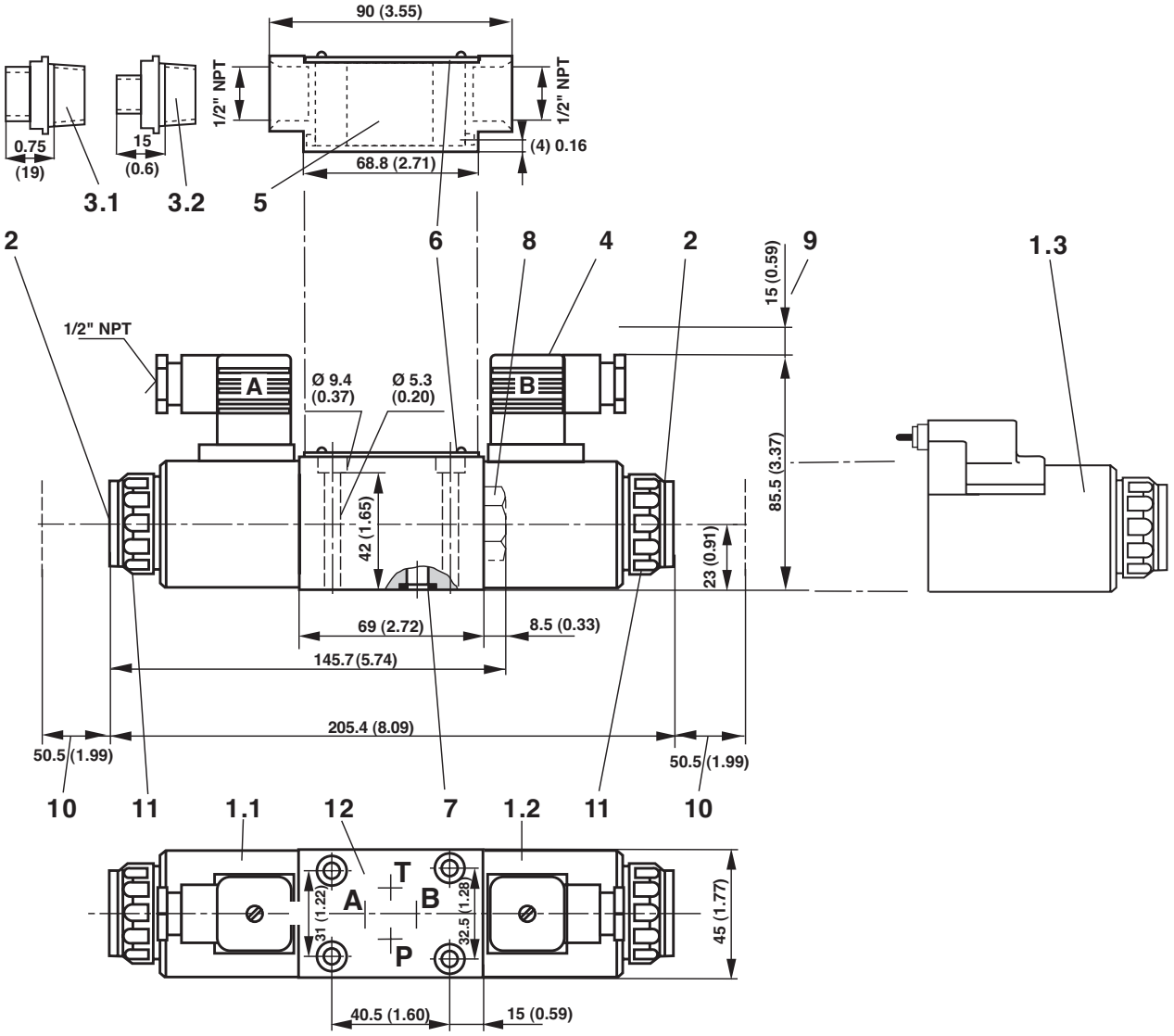
Only for integrated electronics

Straight mating connector for DK26, with shielded cable, is available from Daniel Woodhead, Brad Harrison ®	Brad Harrison P/N
	6 ft. – 70801
	12 ft. – 70802
	20 ft. – 70803

Terminal Connections and Block Diagram - 4 WRAE B 6...-1X/G24 N9 DK26 (K31) (DA)



Unit Dimensions, Model 4 WRAE B 6 – dimensions in millimeters (inches)



1.1 Solenoid a, plug color rust

1.2 Solenoid b, plug color black

1.3 Solenoid, with pins to D( )

2 Emergency operator "N9"
– Emergency operator can only be operated up to a tank pressure of approx. 725 psi (50 bar)
Avoid damage to emergency operator pin bore

3.1 DK25 connector 5-pin for single or double solenoid
Mates with ANSI/B93.55m cable assembly

3.2 DK26 connector 6-pin for integrated electronics

4 Angled plug Z45 to DIN 43 650
Not included

5 Standard terminal box with (2) 1/2" NPT entry ports both ends.

6 Nameplate

7 R ring 9.81 mm x 1.5 mm x 1.78 mm

8 Plug for single solenoid valve

9 Space required to remove plug

10 Space required to remove coil

11 Locknut
Tightening torque = 35 lb-in (4 Nm)

12 Mounting pattern to ISO 4401-3, NFPA T3.5.1M R1 and ANSI B 93.7 **D 03**
Subplates: G341/05 (1/4"NPT)
G341/12 (SAE-4;7/16-20)
G342/05 (3/8"NPT)
G342/12 (SAE-6;9/16-18)
G502/05 (1/2"NPT)
G502/12 (SAE-8;3/4-16)
to data sheet RA 45 052 and
valve fixing screws
Grade 8 M5 x 50 DIN 912-10.9
(10-24UNC x 2")
Tightening torque = 79 lb-in (8.9 Nm)
Must be ordered separately.