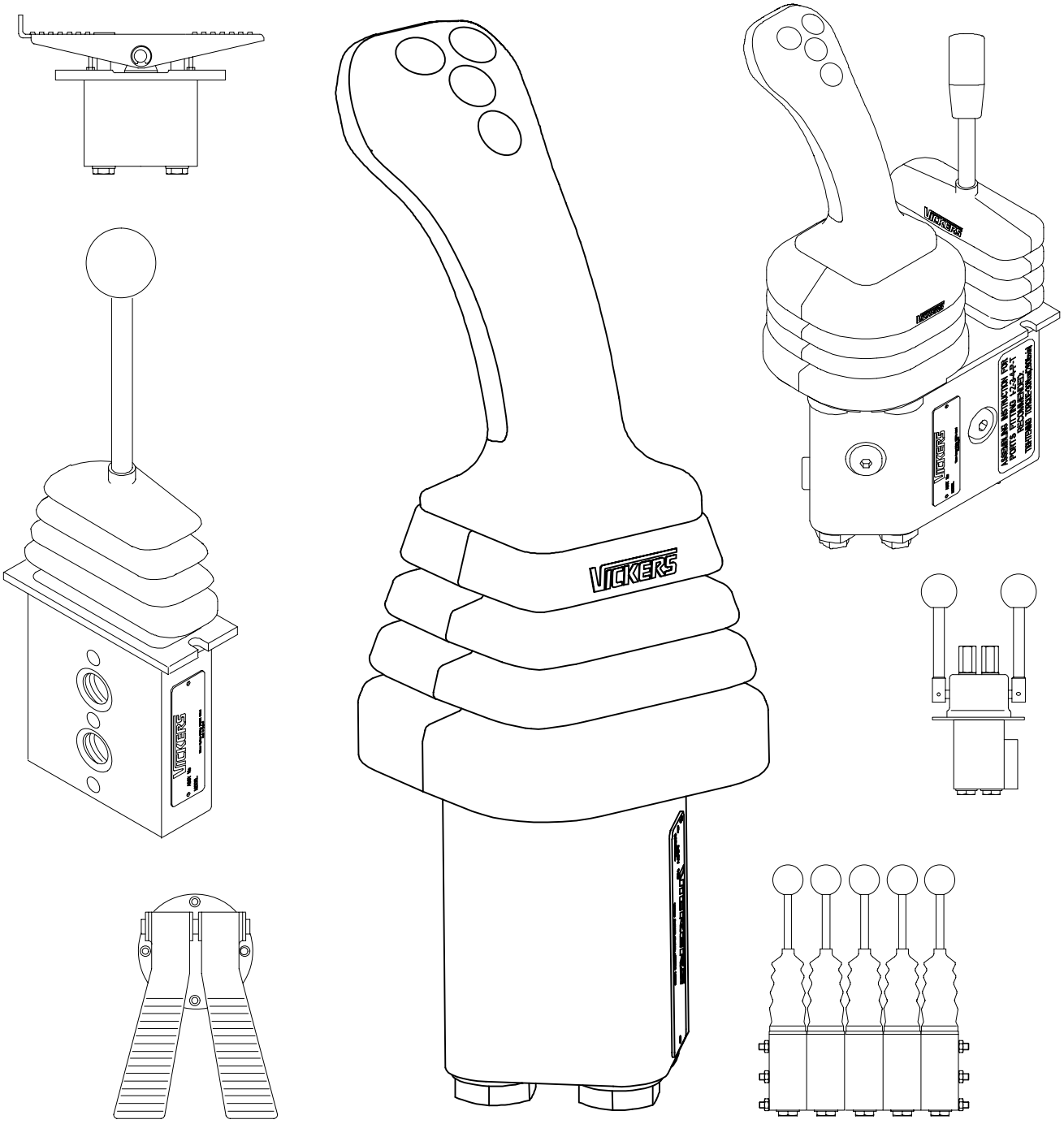
Vickers®

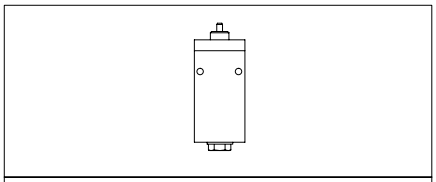
Controls

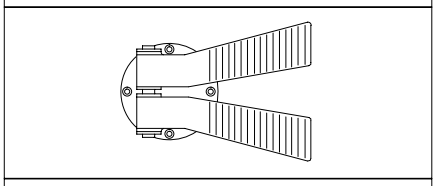
Hydraulic Remote Controls

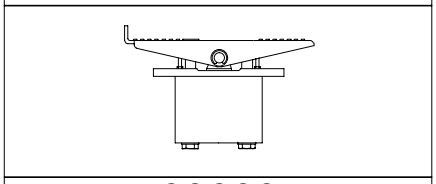
HRC 30 Design

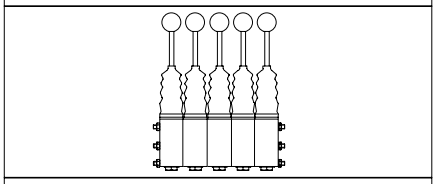


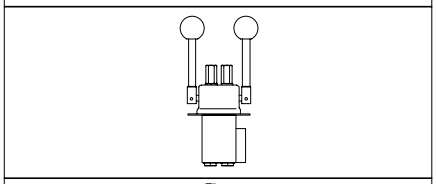
Contents

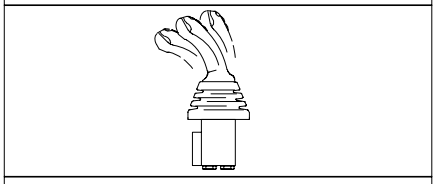


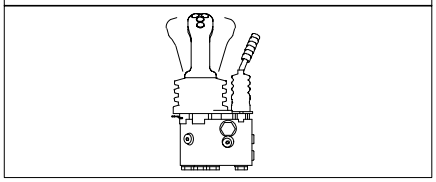


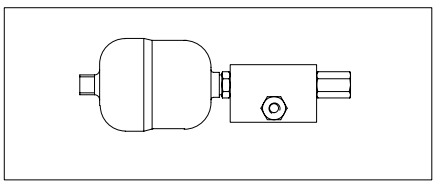












Vickers HRCs Simplify Remote Control of Work Functions and Improve Productivity

Description

HRCs (hydraulic remote controls) are available in hand, foot and mechanically operated versions, designed for pilot pressure actuation and control of remotely located directional valves.

They are intended for mobile and industrial applications in which hydraulic pilot operation of system components is to be controlled from one operator station. On vehicles, the HRCs are typically installed in seat armrests or a console.

Operation

The 30 design HRCs operate on input flows up to 16 L/min (4.2 USgpm) and pressures up to 110 bar (1600 psi) or 150 bar (2175 psi), dependent on the model and the type of response required for the application. HRCs require input pressures equal to the maximum required output pressures, and preferably a minimum of 10 bar (145 psi) higher to assure fast response. From the input pressure an HRC creates reduced output pressures that vary proportionally with lever or pedal stroke, applying the pressures to main directional valves controlling speed and direction of hydraulic actuators. Full details are given in this publication.

Features and Benefits

Low Effort, Precise Control

- Very little operator effort results in less fatigue and more productivity from man and machine.
- Excellent pressure metering capability allows precise control of work functions and less wear-and-tear of the application.
- Precise control in circuits subjected to wide variations in pressure. This control is assured by using an ACX2 supply unit; see opposite page.

Freedom of System Design

- Single-station control of widely placed directional valves readily achieved.
- In a vehicle, for example, an HRC is easily mountable in the cab or elsewhere because it is compact and eliminates the cumbersome mechanical linkage found in many applications.
- Allows ergonomic operator workstation design to be achieved by utilizing the low noise, safe oil temperature, and removing fire hazards from the workstation. This in turn leads to a safer, cleaner, and more operator friendly environment.
- Allows main-stage directional valves to be mounted for optimum piping, quietness and heat dissipation.
- Wide range of output characteristics allow HRC to be perfectly matched to the main-stage valve.

Low Noise Level

- The use of an HRC allows better insulation between the cab and engine because there is no longer a need of holes through the cab wall for linkage to the main valve.
- Low hysteresis provides highly controllable and repeatable control of actuator, and reduces vehicle shock and subsequent noise.

Enhanced Operator Safety

- The HRC needs only a relatively low working pressure, about 30 bar (435 psi). This lessens the risk to the operator from any pipe failure.

Dependable, Quality Products

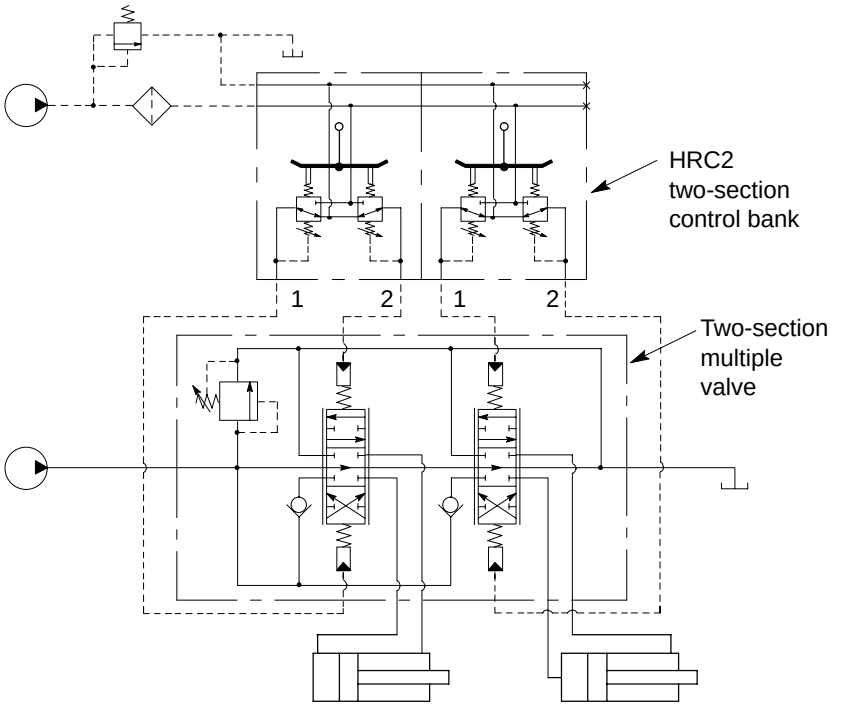
- Robust hydro-mechanical design.
- Maximum reliability born of years of field experience.
- All electrical components used in multi-function operator handles are tested to ensure long and trouble free life.
- Easy servicing.

Additional Features and Benefits of the 30 Design

- Improved control sensitivity from large reductions of dead band in all directions.
- Compact electro-magnetic or mechanical detents available as option on most models.
- Wide range of stylish ergonomically designed hand actuators that may include multiple electrical switches.
- Stroke limiting devices available on most models.
- Flexible aluminum valve body design allows for many special logic features to be incorporated into the product.

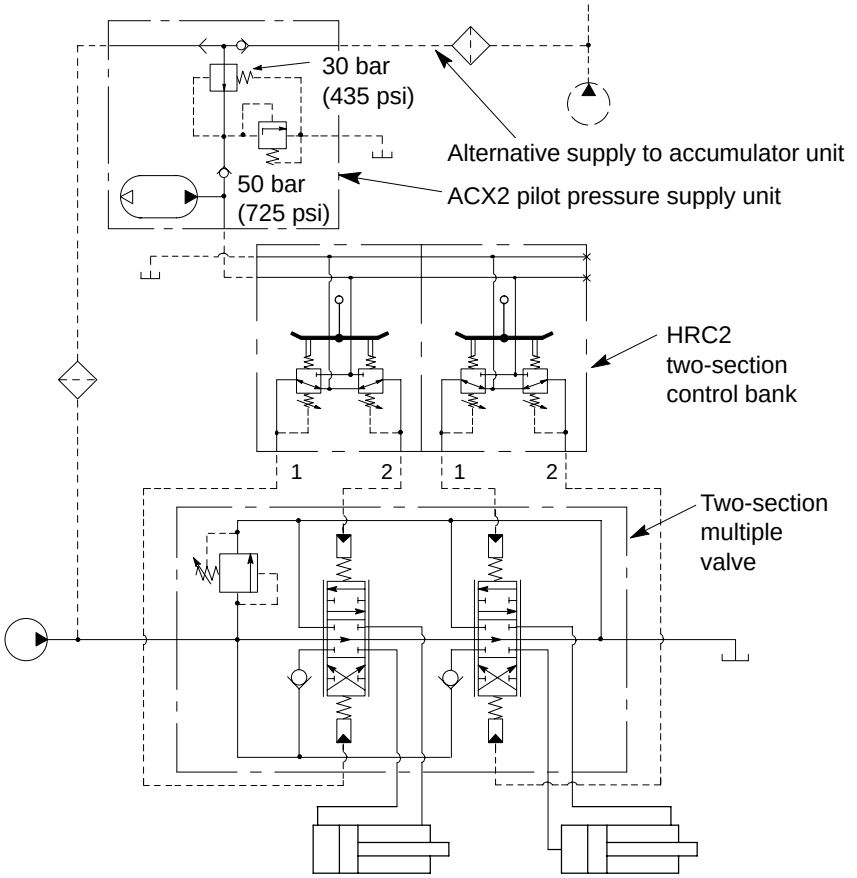
Typical Circuits

a. With separate pilot and main pumps



b. Stabilized input to HRC from an ACX2 accumulator unit. Two main pumps can be alternative sources for the ACX2/HRC pilot system.

For full details of ACX2 supply units see pages 44 to 46.



HRC1-S Series

This is the most simple of the whole product family, and is typically used to control a diverter valve or power clutch, or similar single acting functions.

The whole HRC family of products is based upon the pressure reducing valve concept, using a constant inlet pressure, and providing a variable outlet pressure as a direct result of the actuating mechanism position.

The entire product range uses the same aluminum body concept, and all other metallic external parts are chemically treated using a black oxide process. This enhances the appearance and eliminates the need for any painting. Other common parts throughout the range are the spring capsule, guide and pusher arrangements.

Features

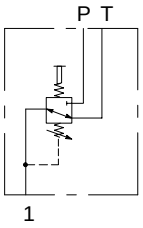
- Lightweight flexible design.
- **Adjustable Guide and Pusher**

This option permits the metering spool stroke to be limited, in order to limit the pilot pressure sent to the outlet of the Hydraulic Remote Control. This device is typically used when the HRCs are supplied with high pressure, but it is desirable to ensure that the maximum outlet pressure is controlled below this inlet pressure. It may also be used to set different cylinder lowering speeds by limiting the spool stroke on the main-stage valve.

Functional Symbol

Mechanically operated models

One control port, half-function HRC1-S0



Model Code

Mechanically Operated Models, Half Function Type

HRC1-S0 -*- 1- 3* (-*) -A ** / *

1 2 3 4 5

1 Port connection options

B = $G^1/_4''$ (BSPF, ISO 228)
M = ISO 6149 (M14)
S = SAE 6 ($^9/_{16}''$ -18 UNF-2B)

2 Design number, 30 series

Subject to change. Installation dimensions unaltered for design numbers 30-39 inclusive.

3 Special suffix

(Not required for standard models) Contact your sales representative for details.

4 Extra features (multiple features may be defined by adding option numbers together)

00 = None
01 = Stroke adjuster
64 = High force return springs

5 Control port output characteristics

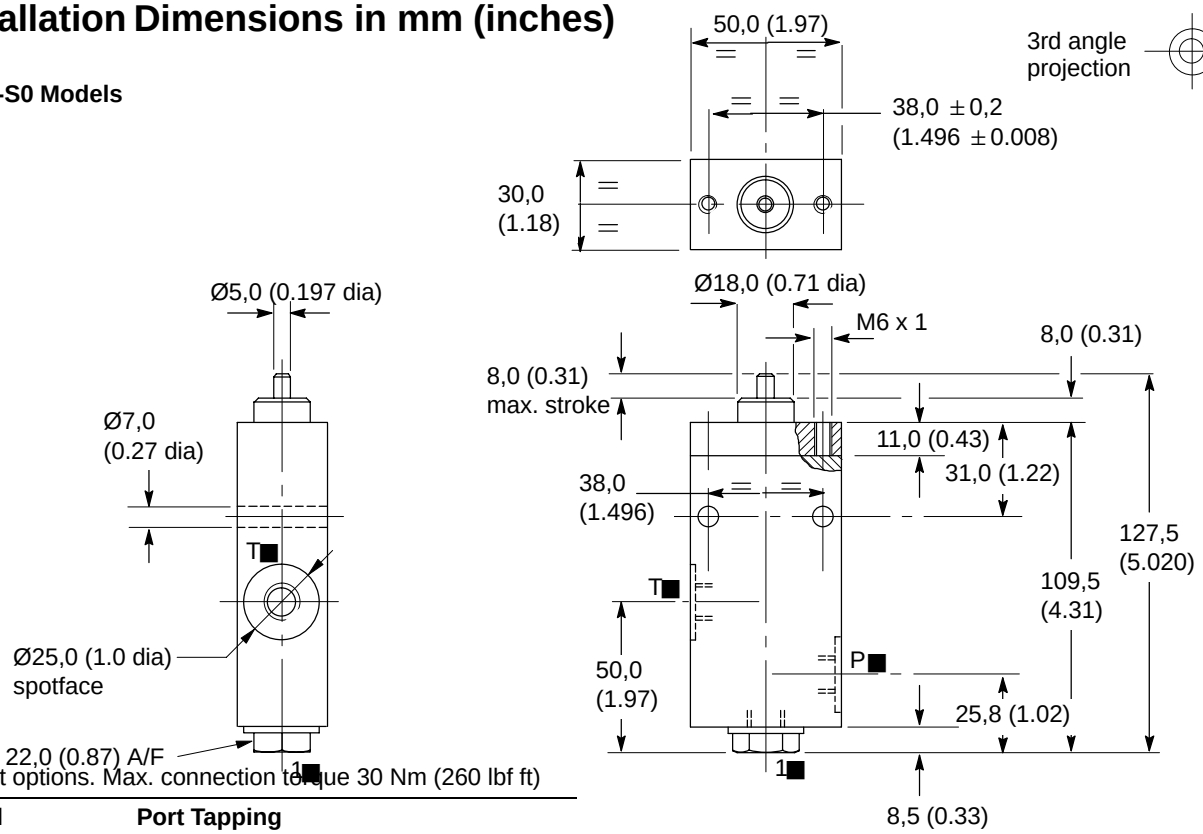
B** = Proportional with forced terminal rise
C** = Proportional without forced terminal rise
D** = Proportional with gain change but without forced terminal rise
E** = Proportional with gain change and with forced terminal rise

See pages 39 and 40 for detailed pressure profiles.

Typical with antiwear hydraulic oil at 33 cSt (155 SUS) and 55°C (131°F)	
Maximum inlet pressure, port P	110 bar (1600 psi)
Maximum controlled (outlet) pressure range, dependent on model. See “Pressure Profile” data on pages 39 and 40	0,8 to 80 bar (11.6 to 1160 psi)
Maximum tank pressure, port T	2 bar (29 psi)
Maximum control flow	16 L/min (4.2 USgpm)
Pressure drop, service to tank	See graph on page 41
Typical operating (input) forces	See graphs on page 41
Hysteresis	< 0,7 bar (10 psi) maximum
Hydraulic fluids	Antiwear hydraulic oils, or crankcase oils to SC, SD, SE or SF classes of SAE J183. The extreme viscosity range is from 380 to 6,4 cSt (1761 to 48 SUS) but the optimum operating range is from 40 to 16 cSt (186 to 81 SUS).
Temperature ranges: Ambient Max. fluid range	 –20 to 70°C (–4 to 158°F) –20 to 90°C (–4 to 194°F)
Filtration recommendations	ISO 4406 20/16
Installation dimensions	See below
Mass, approx. of typical models	0,5 kg (1.1 lb)

Installation Dimensions in mm (inches)

HRC1-S0 Models



■ Port options. Max. connection torque 30 Nm (260 lbf ft)

Model	Port Tapping
HRC1-S0-B	$G^1/_4''$ (BSPF, ISO 228) x 12 (0.47) deep
HRC1-S0-S	SAE 6, $^9/_{16}''$-18 UNF x 13 (0.51) deep
HRC1-S0-M	M14 (ISO 6149)

HRC2-P2 Foot Pedal Operated, Dual Half-Function Type – With Two Foot Pedals

HRC2-P Series

The “P” series is a single function, dual pedal valve typically used to control a single double-acting spool. One foot pedal moves the spool in one direction and the other foot pedal reverses the direction of the spool travel.

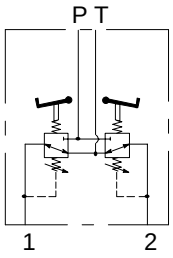
As with all Vickers HRC models, this valve operates on the pressure reducing concept, using a constant inlet pressure, and providing a variable outlet pressure as a direct result of the actuating mechanism.

Features

- Lightweight aluminum body construction.
- Modular output pressure capsules allow quick and simple changes to be made to the valve output characteristics.
- Strong ergonomically designed foot pedal controls.

Functional Symbol

Two control ports, dual half-function HRC2-P2, two independent pedals



Model Code

Foot Pedal Operated Models, Dual Half-Function Type – Two Pedals

HRC2-P2 -*- 1- 3* (-*) - F **/ * - *****

1 2 3 4 5 6 6

P1 P2

1 Port connection options

B = G1/4″ (BSPF, ISO 228)
M = ISO 6149 (M14)
S = SAE 6 (9/16″ -18 UNF-2B)

2 Design number, 30 series

Subject to change. Installation dimensions unaltered for design numbers 30-39 inclusive.

3 Special suffix

(Not required for standard models) Contact your sales representative for details.

4 Actuator options

F = Foot pedals

5 Extra features

00 = None
01 = Stroke adjuster

6 Control port output characteristics

B** = Proportional with forced terminal rise
C** = Proportional without forced terminal rise
D** = Proportional with gain change but without forced terminal rise
E** = Proportional with gain change and with forced terminal rise

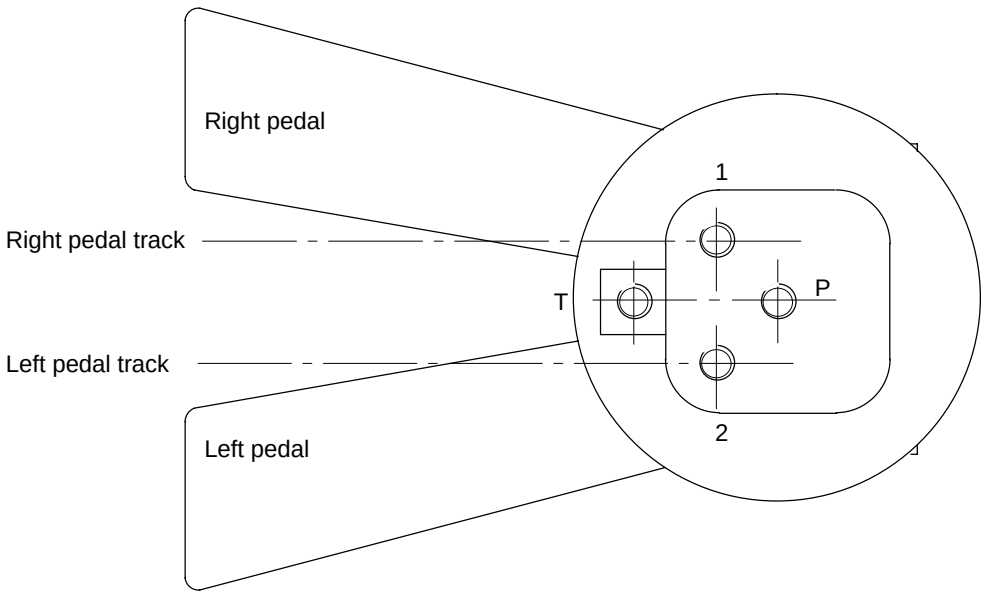
See pages 39 and 40 for detailed pressure profiles.

Operating Data

Typical with antiwear hydraulic oil at 33 cSt (155 SUS) and 55°C (131°F)	
Maximum inlet pressure, port P	110 bar (1600 psi)
Maximum controlled (outlet) pressure range, dependent on model. See “Pressure Profile” data on pages 39 and 40	0,8 to 80 bar (11.6 to 1160 psi)
Maximum tank pressure, port T	2 bar (29 psi)
Maximum control flow	16 L/min (4.2 USgpm)
Pressure drop, service to tank	See graph on page 41
Typical operating (input) forces	See graphs on page 41
Hysteresis	< 0,7 bar (10 psi) maximum
Hydraulic fluids	Antiwear hydraulic oils, or crankcase oils to SC, SD, SE or SF classes of SAE J183. The extreme viscosity range is from 380 to 6,4 cSt (1761 to 48 SUS) but the optimum operating range is from 40 to 16 cSt (186 to 81 SUS).
Temperature ranges: Ambient Max. fluid range	 –20 to 70°C (–4 to 158°F) –20 to 90°C (–4 to 194°F)
Filtration recommendations	ISO 4406 20/16
Installation dimensions	See next page
Mass, approx. of typical models	2,3 kg (5.1 lb)

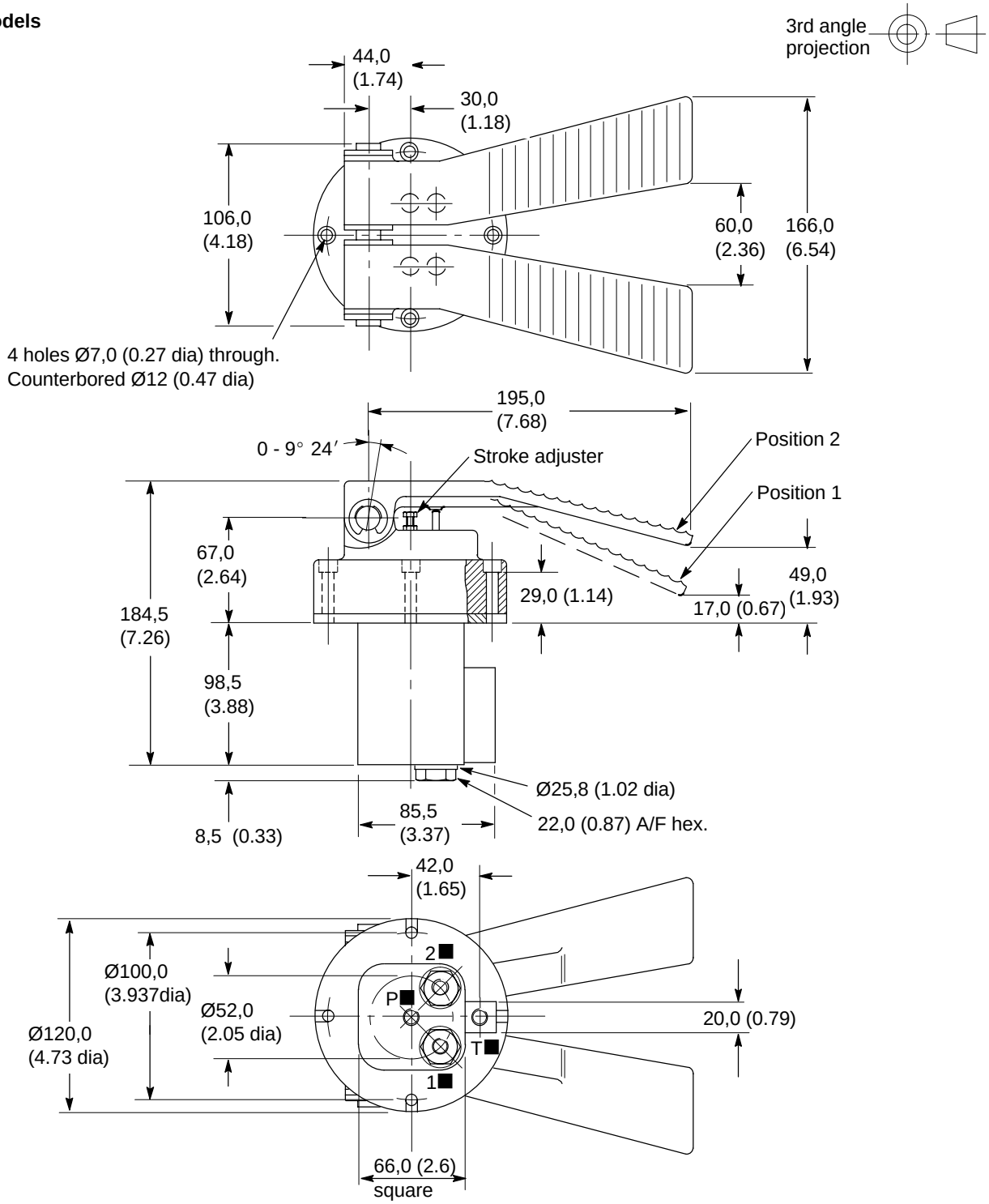
Port Locations and Identities (viewed from underneath the valve)

HRC2-P2 Models



Installation Dimensions in mm (inches)

HRC2-P2 Models



■ Port options. Max. connection torque 30 Nm (260 lbf ft)

Model	Port Tapping
HRC2-P2-B	$G^{1}/_{4}''$ (BSPF, ISO 228) x 12 (0.47) deep
HRC2-P2-S	SAE 6, $^{9}/_{16}''$-18 UNF x 13 (0.51) deep
HRC2-P2-M	M14 (ISO 6149)

HRC2-R1 Foot Pedal Operated, Single-Function Models – Rocker Pedal

HRC2-R Series

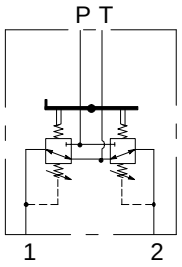
The “R” series is a single-function valve that is fitted with either a standard straight foot pedal or as an option may be fitted with a more ergonomic dual slope pedal. Typical application is for use as a control for a single double acting spool, or as a travel pedal on a tracked vehicle.

Features

● **Adjustable Guide and Pusher**
This option permits the metering spool stroke to be limited, in order to limit the pilot pressure sent to the outlet of the Hydraulic Remote Control. This device is typically used when the HRCs are supplied with high pressure, but it is desirable to ensure that the maximum outlet pressure is controlled below this inlet pressure. It may also be used to set different cylinder lowering speeds by limiting the spool stroke on the main-stage valve.

Functional Symbol

Two control ports, single-function HRC2-R1, rocker pedal



Model Code

Foot Pedal Operated Models, Single Function – Rocker Pedal

HRC2-R1 -*- 1- 3* (-*) - * **/ * -*****

1 2 3 4 5 6 6

P1 P2

1 Port connection options
B = $G^1/_4''$ (BSPF, ISO 228)
M = ISO 6149 (M14)
S = SAE 6 ($^9/_{16}''$ -18 UNF-2B)

2 Design number, 30 series
Subject to change. Installation dimensions unaltered for design numbers 30-39 inclusive.

3 Special suffix
(Not required for standard models) Contact your sales representative for details.

4 Actuator options
F = Foot pedal
H = Obtuse angled pedal

5 Extra features
00 = None
01 = Stroke adjuster

6 Control port output characteristics
B** = Proportional with forced terminal rise
C** = Proportional without forced terminal rise
D** = Proportional with gain change but without forced terminal rise
E** = Proportional with gain change and with forced terminal rise

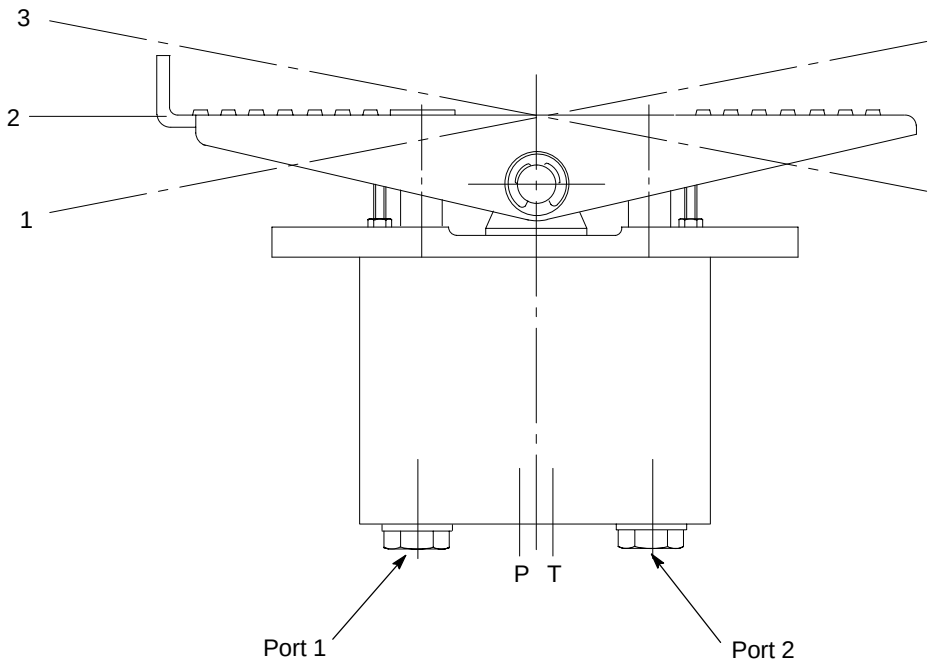
See pages 39 and 40 for detailed pressure profiles.

Operating Data

Typical with antiwear hydraulic oil at 33 cSt (155 SUS) and 55°C (131°F)	
Maximum inlet pressure, port P	150 bar (2180 psi)
Maximum controlled (outlet) pressure range, dependent on model. See “Pressure Profile” data on pages 39 and 40	0,8 to 80 bar (11.6 to 1160 psi)
Maximum tank pressure, port T	2 bar (29 psi)
Maximum control flow	16 L/min (4.2 USgpm)
Pressure drop, service to tank	See graph on page 41
Typical operating (input) forces	See graphs on page 41
Hysteresis	< 0,7 bar (10 psi) maximum
Hydraulic fluids	Antiwear hydraulic oils, or crankcase oils to SC, SD, SE or SF classes of SAE J183. The extreme viscosity range is from 380 to 6,4 cSt (1761 to 48 SUS) but the optimum operating range is from 40 to 16 cSt (186 to 81 SUS).
Temperature ranges: Ambient Max. fluid range	 –20 to 70°C (–4 to 158°F) –20 to 90°C (–4 to 194°F)
Filtration recommendations	ISO 4406 20/16
Installation dimensions	See next page
Mass, approx. of typical models	1,8 kg (3.9 lb)

Port Locations and Identities

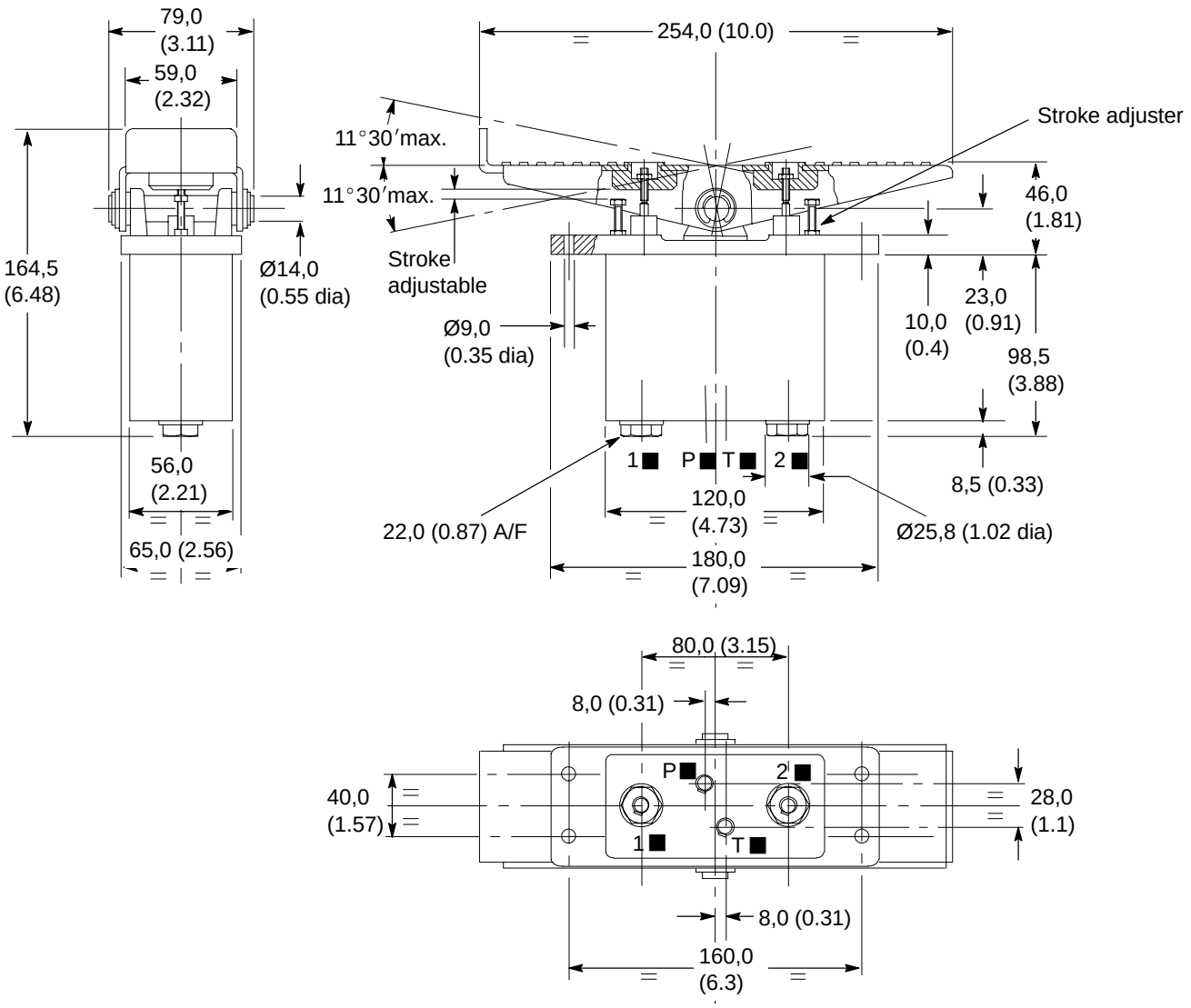
HRC2-R1 Models



Installation Dimensions in mm (inches)

HRC2-R1 Models with Type F Pedal

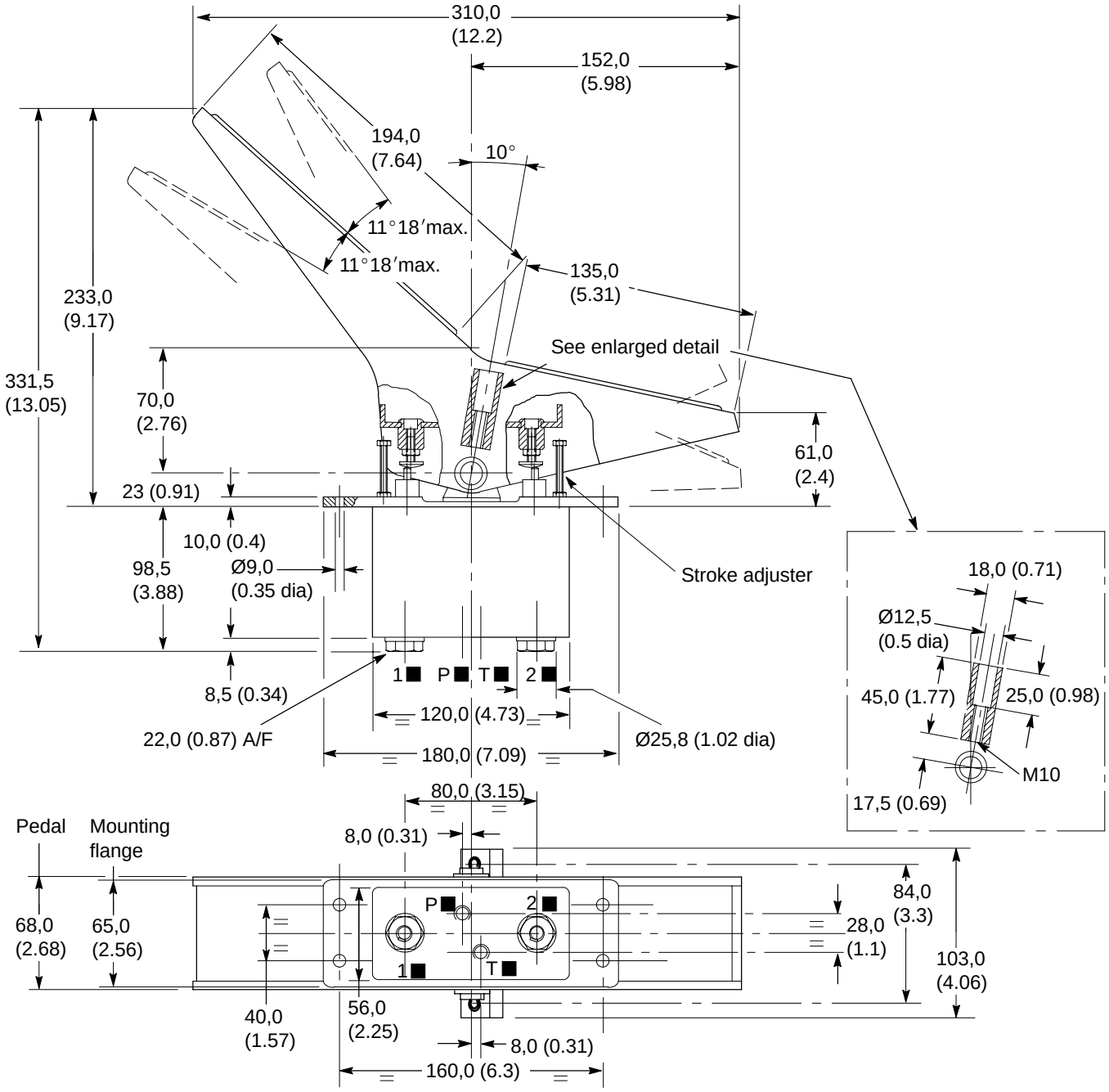
3rd angle projection



■ Port options. Max. connection torque 30 Nm (260 lbf ft)

Model	Port Tapping
HRC2-R1-B	$G^1/_4''$ (BSPF, ISO 228) x 12 (0.47) deep
HRC2-R1-S	SAE 6, $^9/_{16}''$-18 UNF x 13 (0.51) deep
HRC2-R1-M	M14 (ISO 6149)

HRC2-R1 Models with Type H Pedal



■ Port options. Max. connection torque 30 Nm (260 lbf ft)

Model	Port Tapping
HRC2-R1-B	$G^1/_4''$ (BSPF, ISO 228) x 12 (0.47) deep
HRC2-R1-S	SAE 6, $^9/_{16}''$-18 UNF x 13 (0.51) deep
HRC2-R1-M	M14 (ISO 6149)

HRC2-S* Hand Operated, Single-Function Bankable Models
HRC2-LV Hand Operated, Single-Function Bankable Models with Electromagnetic Detents

HRC2-S Series

The “S” series is a single function valve that may be fitted with many different styles of hand operated levers. This unit may be used as a single valve or assembled into a bank of HRC2-S valves where more than one valve spool needs to be controlled. The valve’s design allows a single pump supply and tank return line to be used in a bank of valves, and may be connected at either end of the assembly. The valves may be assembled into banks of up to 8.

Features

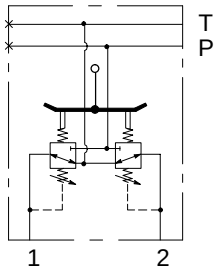
Many optional features are available for this product series such as:

- **Three-position Mechanical Detent** allowing the control actuator to be held in the neutral and fully shifted positions.
- **A Frictional Lock Device** to allow continuous holding of the control actuator at every position of the stroke.
- **A Pull-to-release Safety Device** to ensure actuator is not accidentally operated. Lever may only be operated after lifting the security collar on the actuating lever.
- **Adjustable Guide and Pusher**
  This option permits the metering spool stroke to be limited, in order to limit the pilot pressure sent to the outlet of the Hydraulic Remote Control. This device is typically used when the HRCs are supplied with a high pressure, but it is desirable to ensure that the maximum outlet pressure is controlled below this inlet pressure. It may also be used to set different cylinder lowering speeds by limiting the spool stroke on the main stage valve.

Functional Symbol

Two control ports, single-function.

Single section example



HRC2-LV Series

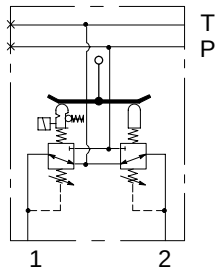
The “LV” series valves are single-function valves, with all the flexibility of the HRC2-S models, but with the additional option of 12 or 24V DC electrical latching detents.

Features

- Electromagnetic detents, available in 12 or 24V DC versions.
- Detent pre-feeling to provide operator feedback prior to detent latch.

Functional Symbol

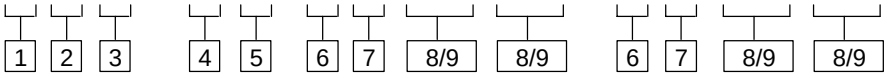
HRC2-LV with one electromagnetic detent



Model Code

Hand Operated, Single-Function Bankable Types

HRC2- ** * - * -1- 3* (-*) - -** -***/* -***/* -// ** -** -***/* -***/* //** (Repeat as necessary)



1 Port options

S = Standard bankable models
LV = Bankable model with electromagnetic detents

2 Number of sections

1 through 8

3 Port connection options

B = G1/4″ (BSPF, ISO 228)
M = ISO 6149 (M14)
S = SAE 6 (9/16″ -18 UNF-2B)

4 Design number, 30 series

Subject to change. Installation dimensions unaltered for design numbers 30-39 inclusive.

5 Special suffix

(Not required for standard models) Contact your sales representative for details.

6 Actuator options (add “L” or “R” after option to define cranked actuator)

A▲= Mechanical (no handle)
B = Handle with ball type plastic knob, straight
BL = Handle with ball type plastic knob, left cranked
BR = Handle with ball type plastic knob, right cranked
S = Actuator with straight plastic handle

7 Extra features (multiple features may be defined by adding option numbers together)

00 = None
01▲= Stroke adjuster
08▲= Three position mechanical detent
16▲= Frictional position hold + neutral detent
32▲= Pull-to-release neutral detent
64▲= Heavy return springs
▲ *Not available on LV models, except with “A” at model code* 9.

8 Control port output characteristics

B** = Proportional with forced terminal rise
C** = Proportional without forced terminal rise
D** = Proportional with gain change but without forced terminal rise
E** = Proportional with gain change and with forced terminal rise

9 Control port options (LV models only)

A = No options
B = No detent, but with pre-feeling before change to outlet pressure
C = With 24V DC electromagnetic detent, and detent pre-feeling point
D = With 24V DC electromagnetic detent, but without detent pre-feeling point
E = With 12V DC electromagnetic detent, and detent pre-feeling point
F = With 12V DC electromagnetic detent, but without detent pre-feeling point

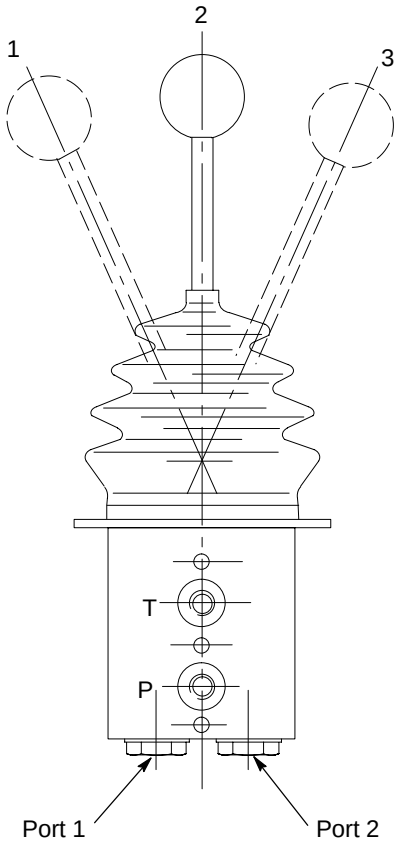
Pre-feeling point is set at 88% of full stroke as standard.

Operating Data

Typical with antiwear hydraulic oil at 33 cSt (155 SUS) and 55°C (131°F)	
Maximum inlet pressure, port P	150 bar (2180 psi)
Maximum controlled (outlet) pressure range, dependent on model. See “Pressure Profile” data on pages 39 and 40	0,8 to 80 bar (11.6 to 1160 psi)
Maximum tank pressure, port T	2 bar (29 psi)
Maximum control flow	16 L/min (4.2 USgpm)
Pressure drop, service to tank	See graph on page 41
Typical operating (input) forces	See graphs on page 41
Hysteresis	< 0,7 bar (10 psi) maximum
Hydraulic fluids	Antiwear hydraulic oils, or crankcase oils to SC, SD, SE or SF classes of SAE J183. The extreme viscosity range is from 380 to 6,4 cSt (1761 to 48 SUS) but the optimum operating range is from 40 to 16 cSt (186 to 81 SUS).
Temperature ranges: Ambient Max. fluid range	 –20 to 70°C (–4 to 158°F) –20 to 90°C (–4 to 194°F)
Filtration recommendations	ISO 4406 20/16
Installation dimensions	See next 2 pages
Mass, approx. of typical models: HRC2-S1	1,7 kg (3.75 lb)
Solenoid power	4 watts
Latching solenoid voltage	12V DC or 24V DC

Port Locations and Identities

HRC2-S1 Models

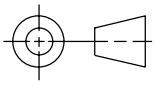


Installation Dimensions in mm (inches)

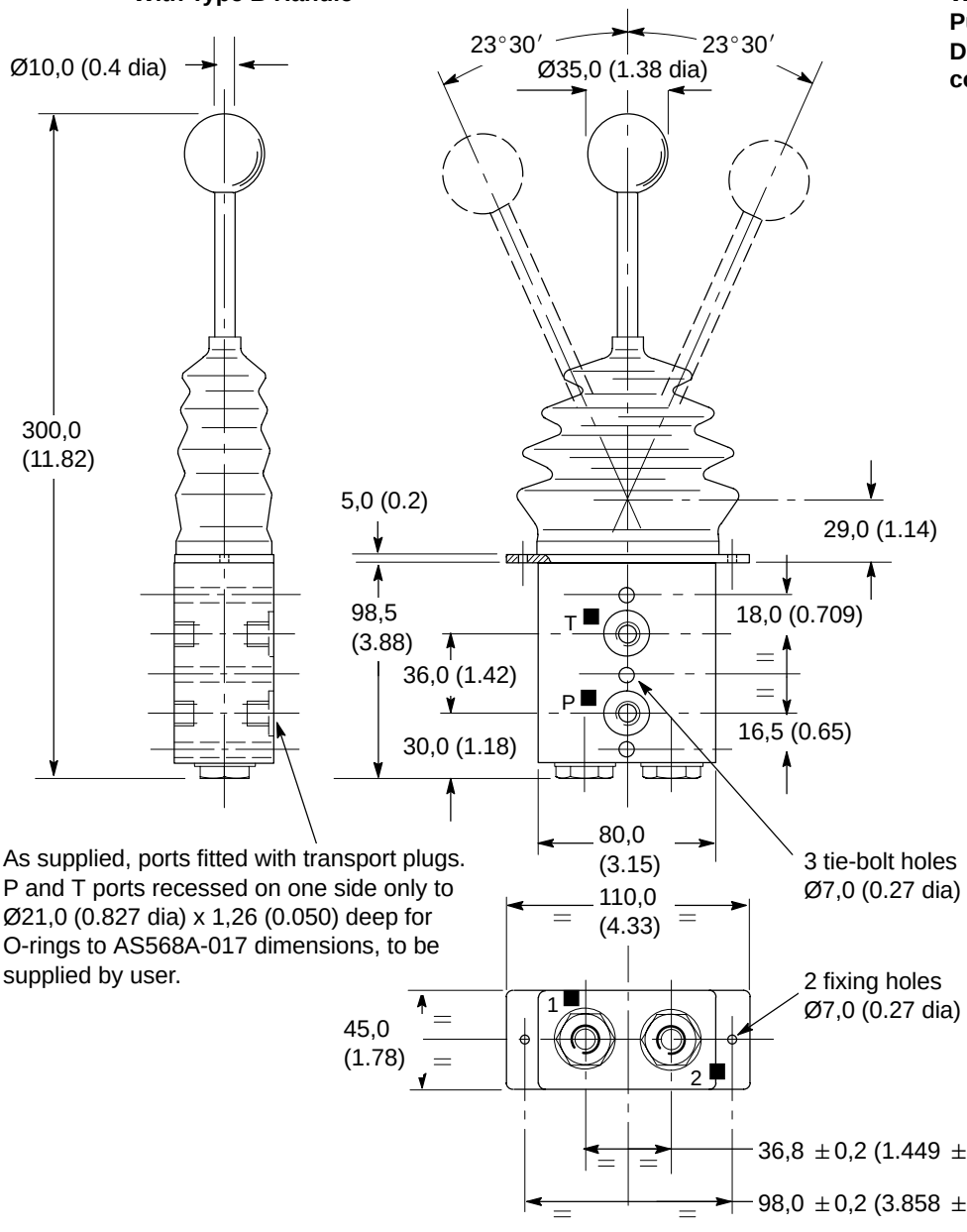
HRC2-S1 Models

For 2- to 8-section assemblies, HRC2-S2 to -S8, see page 19.

3rd angle projection

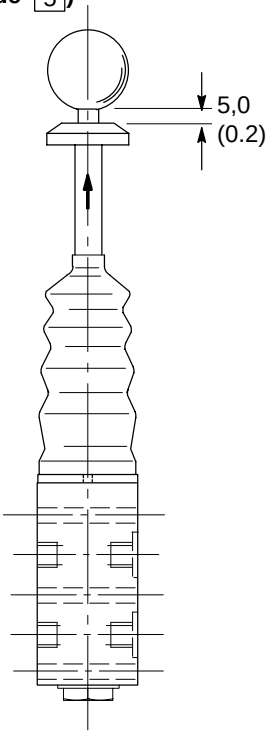


With Type B Handle



As supplied, ports fitted with transport plugs. P and T ports recessed on one side only to Ø21,0 (0.827 dia) x 1,26 (0.050) deep for O-rings to AS568A-017 dimensions, to be supplied by user.

With Type B Handle and Pull-to-release Neutral Detent Option ("32" in model code 5)



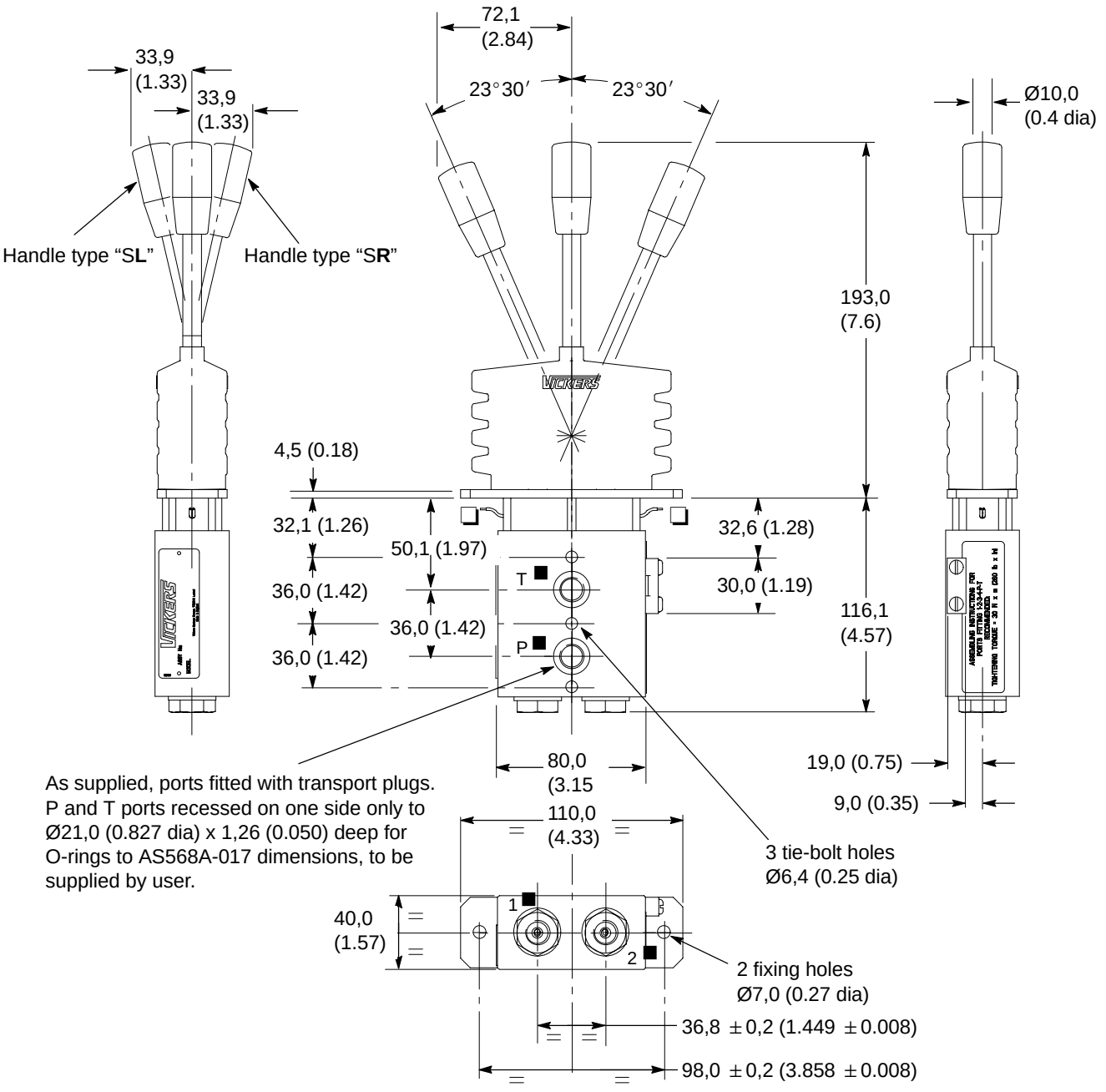
■ Port options. Max. connection torque 30 Nm (260 lbf ft)

Model	Port Tapping
HRC2-S*-B	$G^1/_4''$ (BSPF, ISO 228) x 12 (0.47) deep
HRC2-S*-S	SAE 6, $^9/_{16}''$-18 UNF x 13 (0.51) deep
HRC2-S*-M	M14 (ISO 6149)

HRC2-LV1 Models

For 2- to 8- section assemblies, HRC2-LV2 to -LV8, see page 19.

With Type S Handle



■ Port options. Max. connection torque 30 Nm (260 lbf ft)

Model	Port Tapping
HRC2-LV*-B	$G^1/_4''$ (BSPF, ISO 228) x 12 (0.47) deep
HRC2-LV*-S	SAE 6, $^9/_{16}''$-18 UNF x 13 (0.51) deep
HRC2-LV*-M	M14 (ISO 6149)

❑ *Magnet detent solenoid wire 500 (19.7) long. 1 or 2 wires according to number of magnetic detents.*

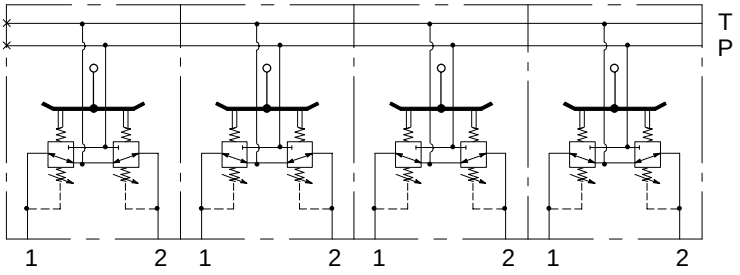
HRC2-S2 to -S8 Models and HRC2-LV2 to -LV8 Models

See previous two pages for details of single sections, HRC2-S1 and HRC2-LV1.

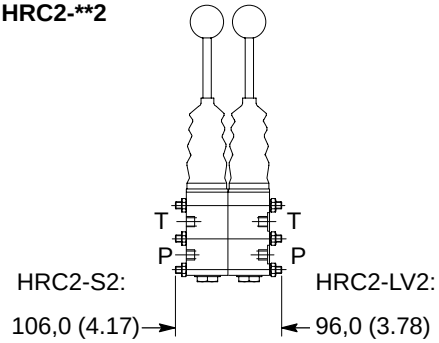
Functional Symbol

Two control ports per section, single-function

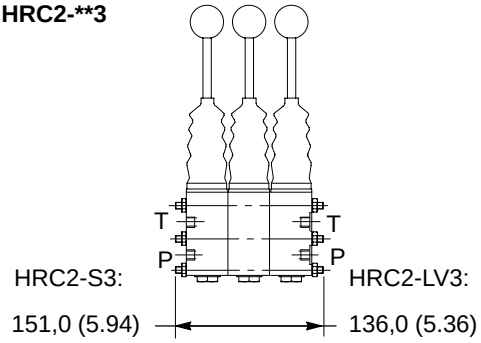
Four section example, i.e. HRC2-S4



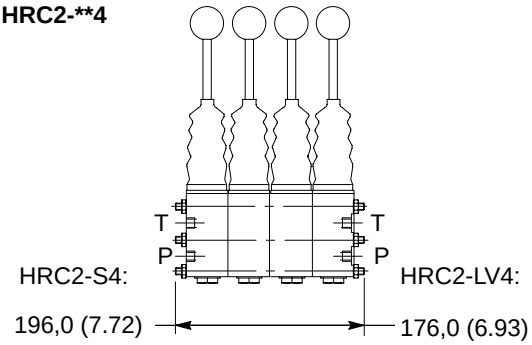
HRC2-2**



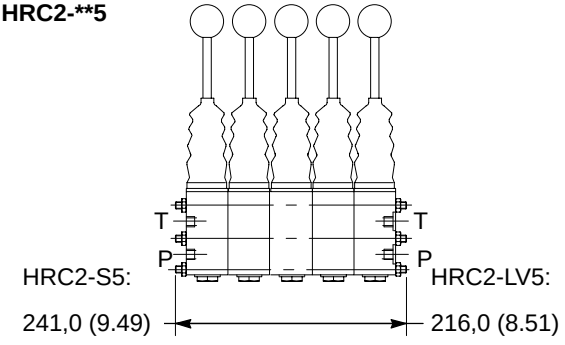
HRC2-3**



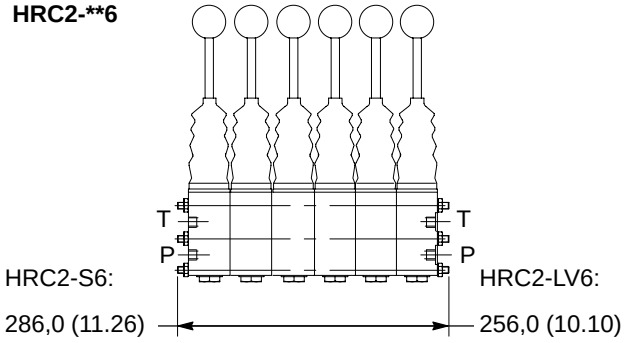
HRC2-4**



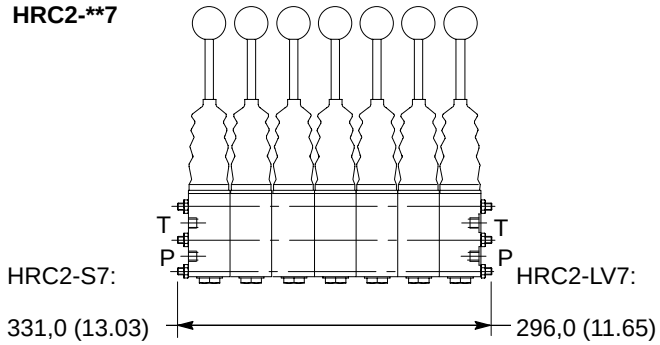
HRC2-5**



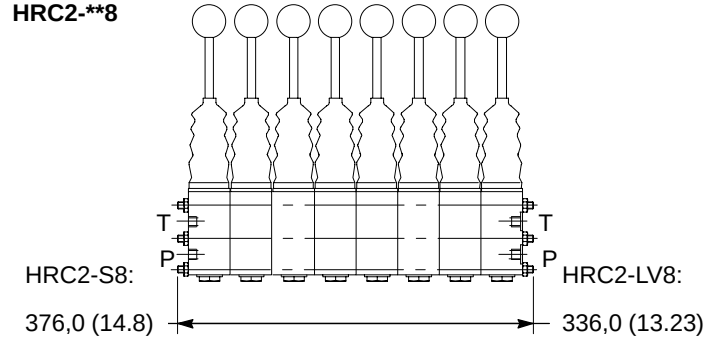
HRC2-6**



HRC2-7**



HRC2-8**



HRC4-H2 Hand Operated Double Function, Dual Actuator Type

HRC4-H Series

The “H” series is a double function valve fitted with two hand operated actuators. It is typically used to control two double acting spools, with each actuator being assigned to different spools. The valve is typically fitted with ball type handle actuators.

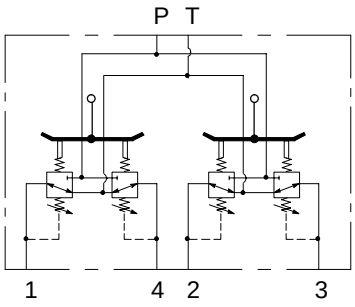
Features

Optional features are available for this product series, such as:

- **Three-position Mechanical Detent** allowing the control actuator to be held in the neutral and fully shifted positions.
- **Adjustable Guide and Pusher** This option permits the metering spool stroke to be limited, in order to limit the pilot pressure sent to the outlet of the Hydraulic Remote Control. This device is typically used when the HRCs are supplied with a high pressure, but it is desirable to ensure that the maximum outlet pressure is controlled below this inlet pressure. It may also be used to set different cylinder lowering speeds by limiting the spool stroke on the main stage valve.

Functional Symbol

Four control ports, double function HRC4-H2, two independent handles



Model Code

Hand Operated Double Function, Dual Actuator Type

HRC4-H2 - * -1- 3* (-*) - * ** - * - *** / - * ** - *** - ***

1 | 2 | 3 | 4 | 5 | 6 | 6 | 4 | 5 | 6 | 6

LH Track P1 P4 | RH Track P2 P3

1 Port connection options

B = $G^1/_4''$ (BSPF, ISO 228)
M = Metric ISO 6149 (M14)
S = SAE 6 ($^9/_{16}''$ -18 UNF-2B)

2 Design number, 30 series

Subject to change. Installation dimensions unaltered for design numbers 30-39 inclusive.

3 Special suffix

(Not required for standard models) Contact your sales representative for details.

4 Actuator options

B = Straight handle with plastic ball knob
G = Bent handle with plastic ball knob

5 Extra features (multiple features may be defined by adding option numbers together)

00 = None
01 = Stroke adjuster
64 = Heavy return springs

6 Control port output characteristics

B** = Proportional with forced terminal rise
C** = Proportional without forced terminal rise
D** = Proportional with gain change but without forced terminal rise
E** = Proportional with gain change and with forced terminal rise

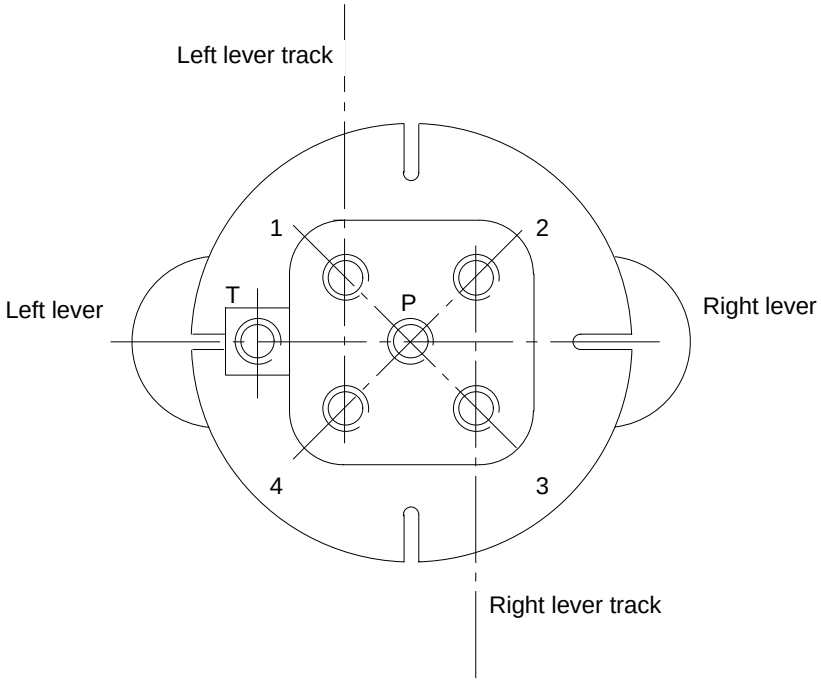
See pages 39 and 40 for detailed pressure profiles.

Operating Data

Typical with antiwear hydraulic oil at 33 cSt (155 SUS) and 55°C (131°F)	
Maximum inlet pressure, port P	110 bar (1600 psi)
Maximum controlled (outlet) pressure range, dependent on model. See “Pressure Profile” data on pages 39 and 40	0,8 to 80 bar (11.6 to 1160 psi)
Maximum tank pressure, port T	2 bar (29 psi)
Maximum control flow	16 L/min (4.2 USgpm)
Pressure drop, service to tank	See graph on page 41
Typical operating (input) forces	See graphs on page 41
Hysteresis	< 0,7 bar (10 psi) maximum
Hydraulic fluids	Antiwear hydraulic oils, or crankcase oils to SC, SD, SE or SF classes of SAE J183. The extreme viscosity range is from 380 to 6,4 cSt (1761 to 48 SUS) but the optimum operating range is from 40 to 16 cSt (186 to 81 SUS).
Temperature ranges: Ambient Max. fluid range	 –20 to 70°C (–4 to 158°F) –20 to 90°C (–4 to 194°F)
Filtration recommendations	ISO 4400 20/16
Installation dimensions	See next page
Mass, approx. of typical models	3,9 kg (8.6 lb)

Port Locations and Identities

HRC2-H2 Models



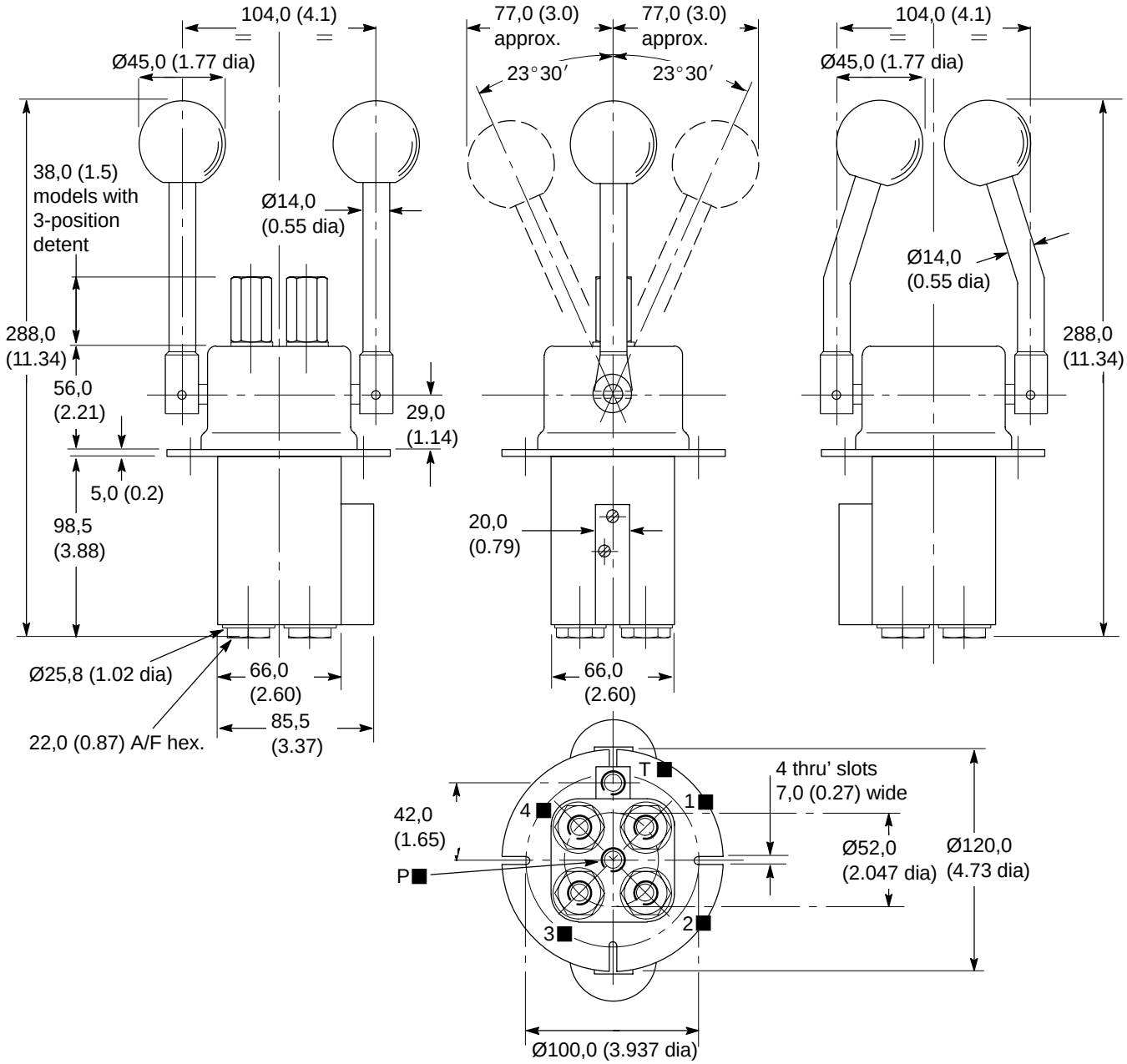
Installation Dimensions in mm (inches)

HRC4-H2 Models

3rd angle projection

With Type B Handles and 3-position Detent

With Type G Handles and Without 3-position Detent



■ Port options. Max. connection torque 30 Nm (260 lbf ft)

Model	Port Tapping
HRC4-H2-B	$G^1/_4''$ (BSPF, ISO 228) x 12 (0.47) deep
HRC4-H2-S	SAE 6, $^9/_{16}''$-18 UNF x 13 (0.51) deep
HRC4-H2-M	M14 (ISO 6149)

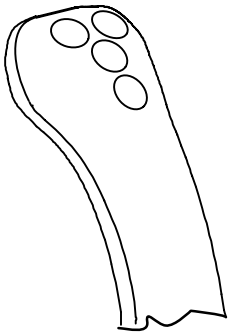
HRC4-J1 Hand Operated Double Function Models, Joystick Actuators
HRC4-LV Hand Operated Double Function Models, Joystick Actuators with Electromagnetic Detent Features

HRC4-J Series

The “J” series is a double function valve that may be fitted with many different styles of hand operated levers. This unit is typically used to control two double acting spools using a single joystick style actuator. This provides a single-handed highly controllable device to control two separate actuators.

Design up-date!
*For HRC4-J1-40 design fitted with ergonomic handle see catalog 5036.04/EN/****/A*

New Ergonomic Handle Showing Switch Arrangement



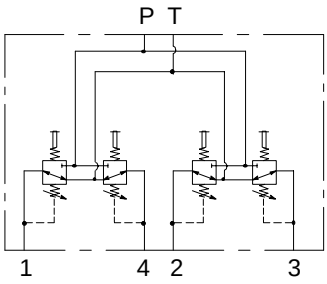
Features

Many optional features are available for this product series, such as:

- Straight ball type handles, straight anatomic handles with or without electrical switches, and ergonomic handles.
- New ergonomic handle package is a very ergonomic and stylish handle fitted with a square gaiter that covers the entire mounting flange when fitted to the application.
- Up to a maximum of five electrical switches may be fitted to the ergonomic style handle in various configurations, that may be used to control a multitude of machine functions. The electrical switches are located on an internal switch carrier assembly that is held firmly in position by the assembly of the two halves of the handle moulding. Membrane pads cover the switch actuation mechanisms and the whole unit complies to IP65 environmental protection.
- New square shaped rubber boot provides the required ergonomics to complement the handle. The gaiter totally encloses all metalwork and electrical cables. It is held in place by a recess on the handle moulding and a lip on the mounting flange. This ensures no external metal or electrical cables are visible to the operator.

Functional Symbol

Four control ports, double-function HRC4-J1, joystick actuator



HRC4-LV Series

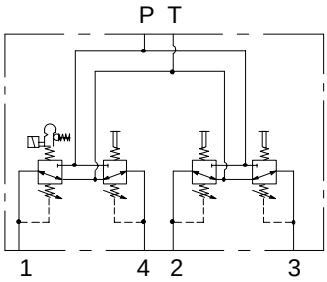
The “LV” series has all the functionality of the “J” series products but with the added flexibility of 12 or 24V DC electromagnetic detents.

Features

- Electromagnetic detents, available in 12 or 24V DC versions.
- Detent pre-feeling to provide operator feedback prior to detent latch.

Functional Symbol

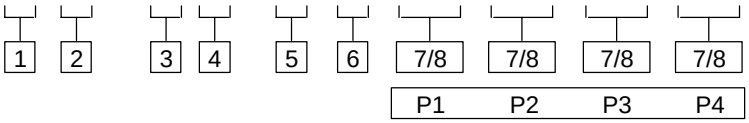
HRC4-LV with one electromagnetic detent



Model Code

Double Function Type, Joystick Actuator

HRC4- ** - * -1- 3* (-*) - * - ** - ***/* - ***/* - ***/* - ***/***



1 Port options

J1 = Standard joystick mode
LV = Standard joystick model with detents

■ *This catalog for HRC4-J1 with anatomic handles. See catalog 5036.04/EN/****/A for HRC4-J1-40 design, with ergonomic handles.*

2 Port connection options

B = $G^1/_4''$ (BSPF, ISO 228) round mounting flange ◆
M = Metric (ISO 6149) M14 square mounting flange
N = Metric (ISO 6149) M14 round mounting flange ◆
S = SAE 6 ($^9/_{16}''$ -18 UNF-2B) round mounting flange ◆
Q = $G^1/_4''$ (BSPF, ISO 228) square mounting flange
X = SAE 6 ($^9/_{16}''$ -18 UNF-2B) square mounting flange

◆ *Not available with handle option "X*".*

3 Design number, 30 series

Subject to change. Installation dimensions unaltered for design numbers 30-39 inclusive.

4 Special suffix

(Not required for standard models)
Contact your sales representative for details.

5 Actuator options (add "L" or "R" after option to define cranked actuator)

Applies only to HRC4-J1 models.
B = Handle with plastic knob, straight
BS= Actuator with straight plastic handle

With anatomic handle

Applies only to HRC4-J1 models.
C = Standard
E = 2 position detented rocker switch
P = 2 position non-detented rocker switch and side mounted push button
R = 3 position detented rocker switch

With ergonomic handle

Applies only to HRC4-LV models.
For HRC4-J1 models with ergonomic handles see 40 design, catalog number 5036.04/EN/****/A.
X = Standard
XA = Single push button
XAP = Single push button
XB = Two push buttons
XD = Three push buttons
XDP = Three push buttons
XF = Four push buttons
XH = Five push buttons
XK = Four push buttons (option "XD" + single push button on front)
XKP = Four push buttons (option "XD" + single push button on front)
XN = Single push button on front
XT = Five push buttons (option "XH", but with dual common conductors)
XZ = Two push buttons (one each on opposite faces)
XZP = Two push buttons (one each on opposite faces)

***P = High power switch in position 1.*

See pages 37–38 for pictorial views of handle options.

6 Extra features (multiple features may be defined by adding option numbers together)

00 = None
01 = Stroke adjuster ■
64 = Heavy return springs ■

■ *Not available with electromagnetic detent.*

7 Control port output characteristics

B** = Proportional with forced terminal rise
C** = Proportional without forced terminal rise
D** = Proportional with gain change but without forced terminal rise
E** = Proportional with gain change and with forced terminal rise

See pages 39 and 40 for detailed pressure profiles.

8 Control port options (LV models only)

A = No options
B = No detent, but with pre-feeling before change to outlet pressure
C = With 24V DC electromagnetic detent, and detent pre-feeling point
D = With 24V DC electromagnetic detent, but without detent pre-feeling point
E = With 12V DC electromagnetic detent, and detent pre-feeling point
F = With 12V DC electromagnetic detent, but without detent pre-feeling point

Pre-feeling point set at 88% of full stroke as standard.

Operating Data

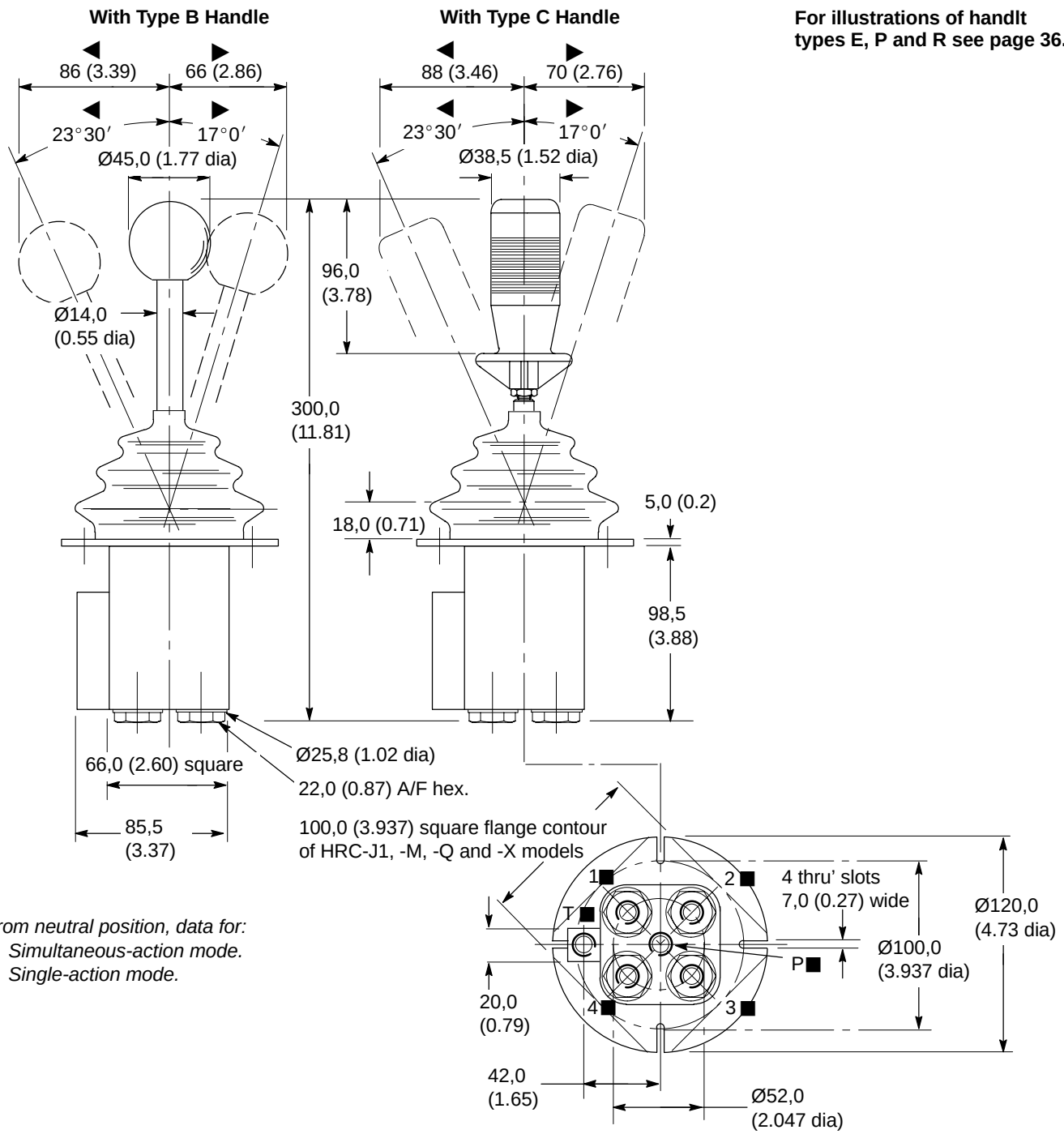
Typical with antiwear hydraulic oil at 33 cSt (155 SUS) and 55°C (131°F)	
Maximum inlet pressure, port P: HRC4-** models	110 bar (1600 psi)
Maximum controlled (outlet) pressure range, dependent on model. See “Pressure Profile” data on pages 39 and 40	0,8 to 80 bar (11.6 to 1160 psi) 3 bar (43.5 psi) for electromagnetic versions
Maximum tank pressure, port T	2 bar (29 psi)
Maximum control flow	16 L/min (4.2 USgpm)
Pressure drop, service to tank	See graph on page 41
Typical operating (input) forces	See graphs on page 41
Hysteresis	< 0,7 bar (10 psi) maximum
Hydraulic fluids	Antiwear hydraulic oils, or crankcase oils to SC, SD, SE or SF classes of SAE J183. The extreme viscosity range is from 380 to 6,4 cSt (1761 to 48 SUS) but the optimum operating range is from 40 to 16 cSt (186 to 81 SUS).
Temperature ranges: Ambient Max. fluid range	 –20 to 70°C (–4 to 158°F) –20 to 90°C (–4 to 194°F)
Filtration recommendations	ISO 4406 20/16
Installation dimensions	See next page
Mass, approx. of typical models: HRC4-J1	2,5 kg (5.5 lb)
Solenoid power	4 watts
Latching solenoid voltage	12V DC or 24V DC
Operating power of electrical switches	**Standard Switch** For operation of relays and operation of direct loads such as (DG4V-3 switching valve). Limiting load 65 mH at 1000 Hz, 24V, 1.3 amps, 1 million cycles. **High Power Switch** For operation of loads such as (vehicle horn). Limiting load 5.6 mH at 1000 Hz, 24V, 6.3 amps, 100,000 cycles.

Installation Dimensions in mm (inches)

HRC4-J1 Models

3rd angle projection

For illustrations of handlt types E, P and R see page 36.



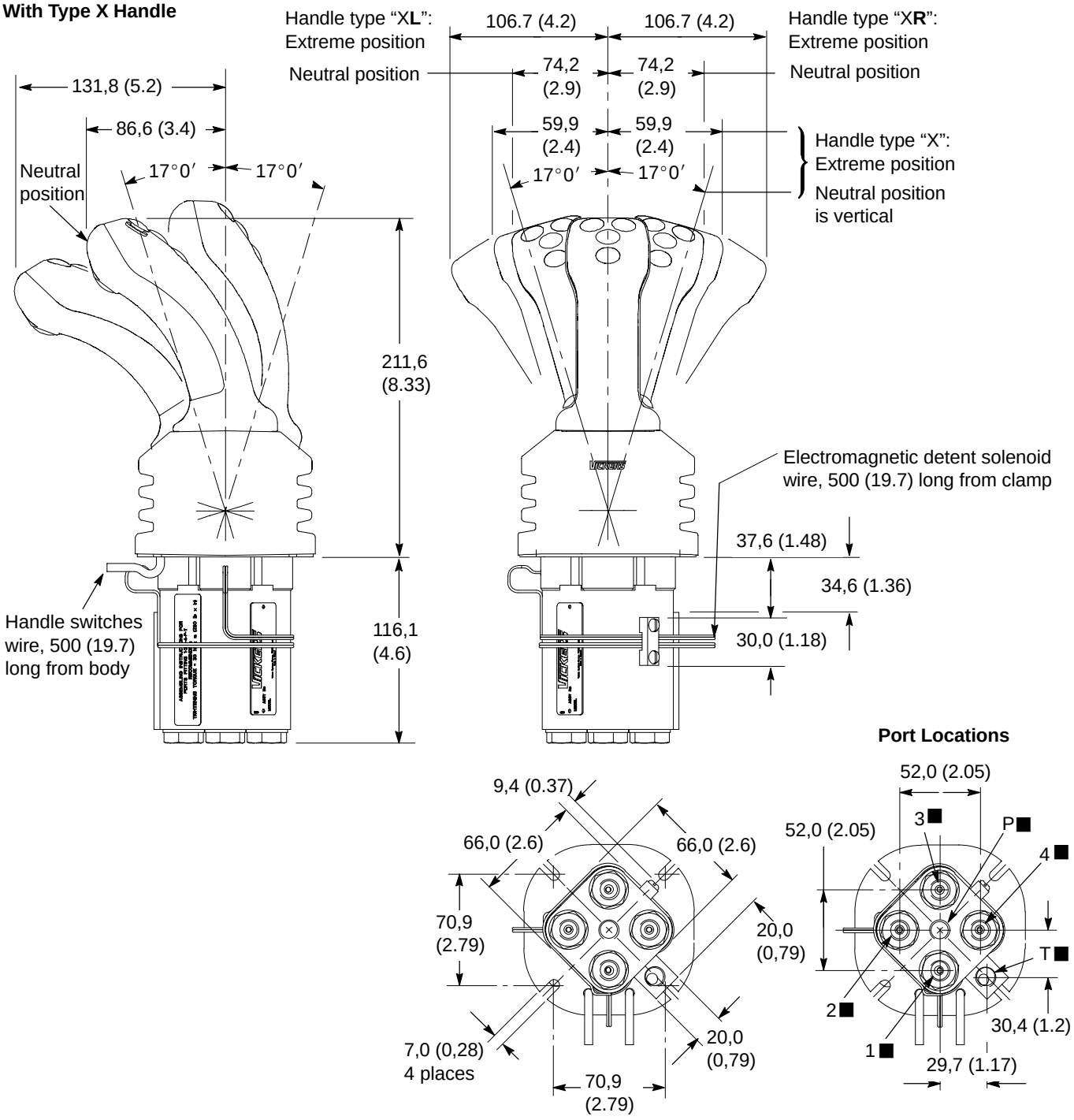
From neutral position, data for:
◀ *Simultaneous-action mode.*
▶ *Single-action mode.*

■ Port options. Max. connection torque 30 Nm (260 lbf ft)

Model	Port Tapping
HRC4-J1-B/Q	$G^1/_4''$ (BSPF, ISO 228) x 12 (0.47) deep
HRC4-J1-S/X	SAE 6, $^9/_{16}''$-18 UNF x 13 (0.51) deep
HRC4-J1-M/N	M14 (ISO 6149)

HRC4-LV Models

With Type X Handle



Port Locations

■ Port options. Max. connection torque 30 Nm (260 lbf ft)

Model	Port Tapping
HRC4-LV-B/Q	$G^1/_4''$ (BSPF, ISO 228) x 12 (0.47) deep
HRC4-LV-S/X	SAE 6, $^9/_{16}''$-18 UNF x 13 (0.51) deep
HRC4-LV-M/N	M14 (ISO 6149)

HRC6-LV Combination Dual Axis and Single Axis Loader Control Valve Package
HRC7-LV Combination Dual Axis and Single Axis Loader Control Valve Package and Float Spool

The Hydraulic Remote Control loader valve is a development of existing HRC technology and a new compact electromagnetic detent arrangement. The valve is a combined HRC2 (stackable type valve) and a HRC4 (joystick type valve) with electromagnetic detents, packaged in a single manifold-style block. The package was specifically designed for wheeled and tracked loaders.

Some manufacturers currently fit an HRC control package that consists of 3 sectional (HRC2) style HRCs, as this is the preferred method of control in some market areas. If this is the case, we offer a suitable solution using the compact electromagnetic detent development which can be packaged with the same functionality into an HRC2-LV stackable type valve. See HRC2-LV section of this publication for more details.

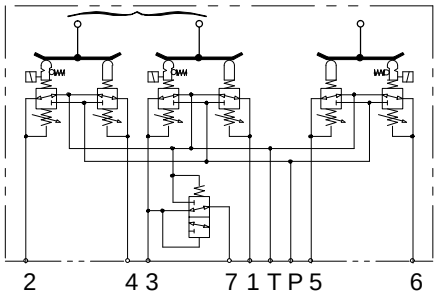
This package can be further enhanced by the use of the new ergonomic anatomic handle that has been developed for the standard HRC product range. This provides the machine builder with both the modern ergonomics required for today's cab design, as well as the ability to have up to 5 electrical switches fitted into the handle that may be used to control a multitude of machine functions.

Functional Symbol

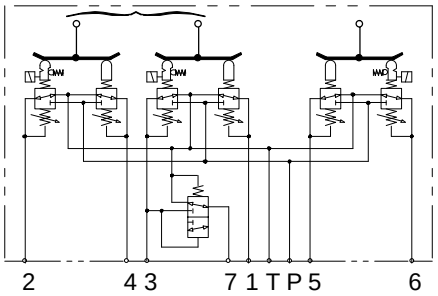
Double-function joystick handle with five control ports, plus single function with two control ports.

The functional symbols shown are of the HRC7.

HRC7–LV*-**1**----



HRC7–LV*-**2**----



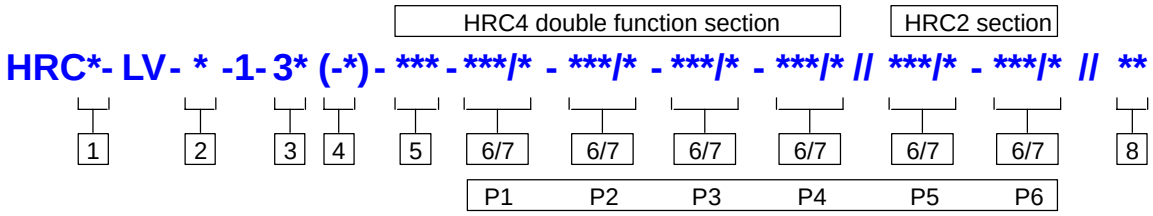
HRC7 Float Spool

This provides a 7th function within the valve package, typically to provide "float" function on the machine. This facility is availalble in two options:
1. Port 7 vents when float spool pressure setting is reached, or
2. Port 7 is vented until float spool pressure setting is reached.

Features	Benefits
Compact Electromagnetic Detent	Provides a very compact package due to the electromagnetic detents being located in line with the operating spool center lines. Ergonomic and aesthetically good looking for operator area design.
Flexible Aluminum Manifold Package	1. Provides a compact monobloc design that encompasses both a double axis (HRC4) and a single axis (HRC2) in a single block. 2. Circuit logic elements such as pressure reducing valves, float spool options, etc., can be included within the package design. 3. No leakage between sections.
Single Pressure and Tank Line Connections	Less plumbing and thus lower installed cost on the machine.
Wide Range of Electrical Switch Configurations	Actuators can be fitted with up to 5 electrical switches in many different configurations. See pages 37, 38 and 39.
Adjustable Detent Pre-feeling	Allows the operator to have feedback through the operating lever as he approaches the detent point.
Free Use of Second Axis when First is Detented	Once the first axis has been placed into a detented position, the other axis of the valve can still be operated in free fall condition. This provides highly controllable and proportional control of the actuator on the non-detented axis. **This is a mandatory requirement for tandem circuits.**

Model Code

Monobloc Loader Valve Configuration



1 Valve option

6 = Standard
7 = Float spool option

2 Port connection options

B = $G^1/_4''$ (BSPF, ISO 228)
S = SAE 6 ($^9/_{16}''$ -18 UNF-2B)
M = ISO 6149 (M14)

3 Float function, HRC7 only

1 = Port 7 pressure vents at float spool setting (see 9)
2 = Port 7 vented until float spool setting reached (see 9)

4 Design number, 30 series

Subject to change. Installation dimensions unaltered for design numbers 30-39 inclusive.

5 Special suffix

(Not required for standard models) Contact your sales representative for details.

6 Actuator options
With ergonomic handle

X = Standard
XA = Single push button
XAP = Single push button
XB = Two push buttons
XD = Three push buttons
XDP = Three push buttons
XF = Four push buttons
XH = Five push buttons
XK = Four push buttons (option “XD” + single push button on front)
XKP = Four push buttons (option “XD” + single push button on front)
XN = Single push button on front
XT = Five push buttons (option “XH”, but with dual common conductors)
XZ = Two push buttons (one each on opposite faces)
XZP = Two push buttons (one each on opposite faces)

***P= High power switch in position 1.*

See pages 37–38 for pictorial views of handle options

7 Control port output characteristics

B** = Proportional with forced terminal rise
C** = Proportional without forced terminal rise
D** = Proportional with gain change but without forced terminal rise
E** = Proportional with gain change and with forced terminal rise

See pages 39 and 40 for detailed pressure profiles.

8 Control port options

B = No detent, but with pre-feeling before change to outlet pressure
C = With 24V DC electromagnetic detent, and detent pre-feeling point
D = With 24V DC electromagnetic detent, but without detent pre-feeling point
E = With 12V DC electromagnetic detent, and detent pre-feeling point
F = With 12V DC electromagnetic detent, but without detent pre-feeling point

Pre-feeling point set at 88% of full stroke as standard.

9 Float spool setting in bar (psi) HRC7 only (example)

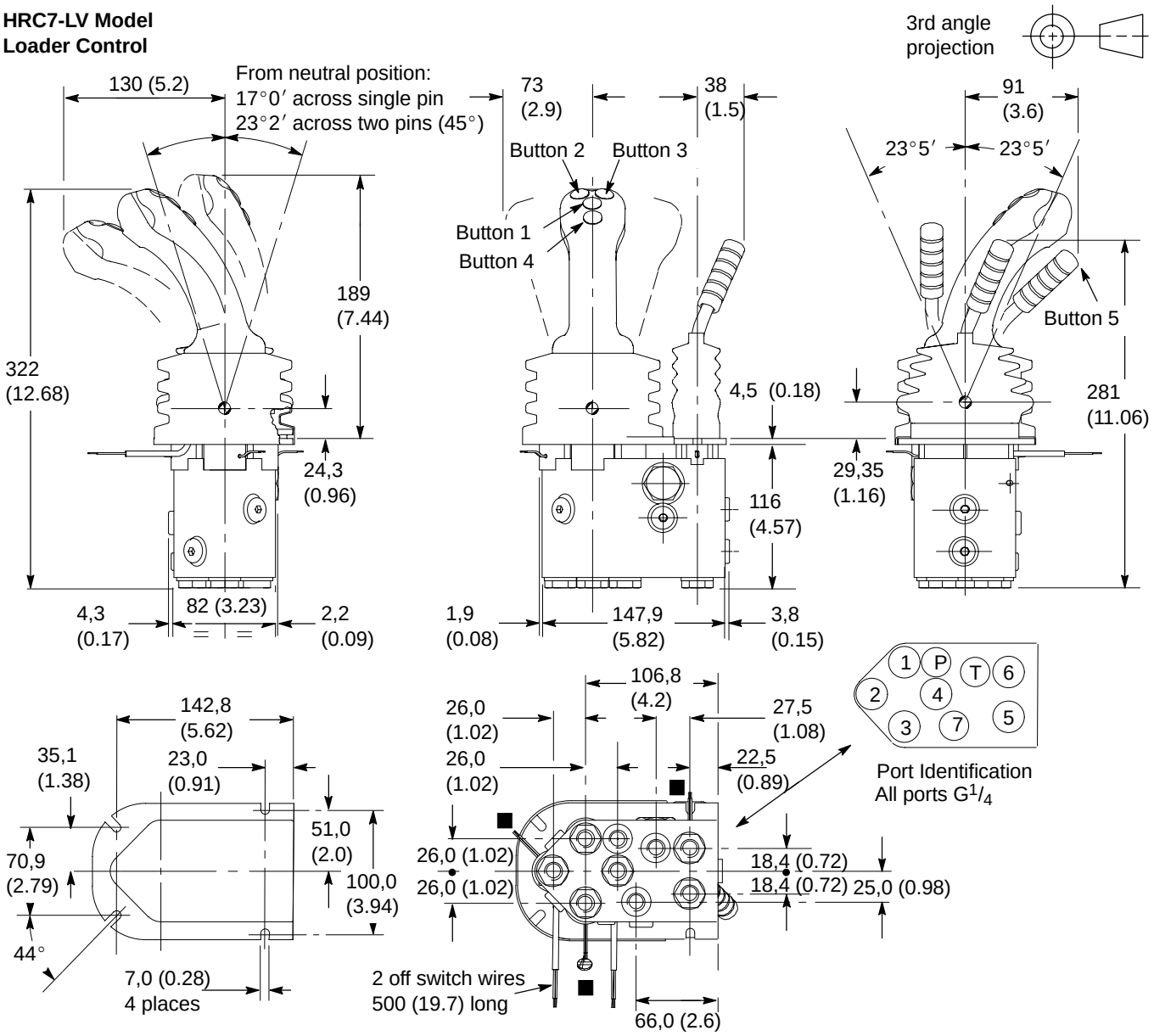
22 = 22 bar (324 psi)

Operating Data

Typical with antiwear hydraulic oil at 33 cSt (155 SUS) and 55°C (131°F)	
Maximum inlet pressure, port P	110 bar (1600 psi)
Maximum controlled (outlet) pressure range, dependent on model. See “Pressure Profile” data on pages 39 and 40	0,8 to 80 bar (11.6 to 1160 psi)
Maximum tank pressure, port T	2 bar (29 psi)
Maximum control flow	16 L/min (4.2 USgpm)
Pressure drop, service to tank	See graph on page 41
Typical operating (input) forces	See graphs on page 41
Hysteresis	< 0,7 bar (10 psi) maximum
Hydraulic fluids	Antiwear hydraulic oils, or crankcase oils to SC, SD, SE or SF classes of SAE J183. The extreme viscosity range is from 380 to 6,4 cSt (1761 to 48 SUS) but the optimum operating range is from 40 to 16 cSt (186 to 81 SUS).
Temperature ranges: Ambient Max. fluid range	 –20 to 70°C (–4 to 158°F) –20 to 90°C (–4 to 194°F)
Filtration recommendations	ISO 4400 20/16
Installation dimensions	See next page
Mass, approx. of typical models: HRC6-LV	4,7 kg (10.3 lb)
Solenoid power	4 watts
Latching solenoid voltage	12V DC or 24V DC
Operating power of switches	**Standard Switch** For operation of relays and operation of direct loads such as (DG4V3 switching valve). Limiting load 65 mH at 1000 Hz, 24V, 1.3 amps, 1 million cycles. **High Power Switch** For operation of loads such as (vehicle horn). Limiting load 5.6 mH at 1000 Hz, 24V, 6.3 amps, 100,000 cycles.

Installation Dimensions in mm (inches)

HRC7-LV Model
Loader Control

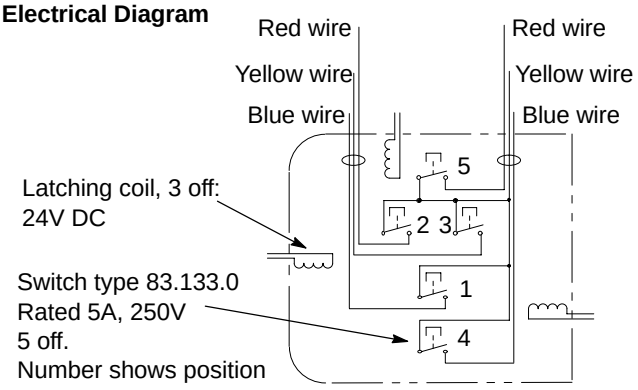


Detail of Flange Mounting Bolt Slots

■ *Magnet wire 200 (7.9) long, 3 places.*

HRC6-LV has same dimensions without 7th port

Electrical Diagram



General Description

The established range of Vickers HRC, 30 series, hydraulic remote controls is extended by the release of this new model designed for control of forward/reverse traction drive plus steering. Typical applications include crawler excavators, skid-steering loaders and similar vehicles where independent hydraulic motors are used for left and right traction drives.

General construction, output characteristics and available options are as for the existing range. HRC valves provide a pressure output signal according to the displacement of the manual actuator and the selected characteristics of the spring capsule assembly, to accurately control remotely located pilot-operated directional valves or pump displacement controls.

The new HRC4-TC model includes a system of four shuttle valves built into the valve body. These select forward/reverse and left/right pilot signals suitable for direct connection either to the displacement controls of variable displacement traction motors, or to pilot-operated directional valves controlling transmission power flow to fixed displacement motors.

Features

- Integral shuttle valves packaged in minimum space with reduced risk of leakages.

Additionally all the general benefits from Vickers standard model range:

- Low effort, precise control.
- Less operator fatigue and more machine productivity.
- Excellent pressure metering capability.
- Precise control gives less wear and tear in the transmission.

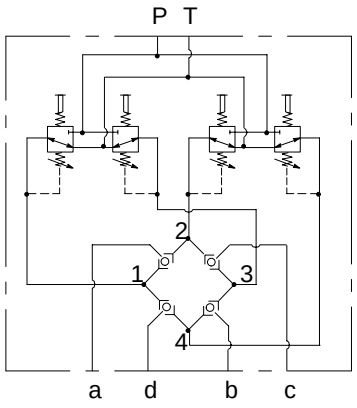
Freedom of System Design

- Single-station control of widely spaced motors/power control valves
- Lower control valves can be mounted for optimum piping, quietness and efficiency.

Low Operator Noise Level

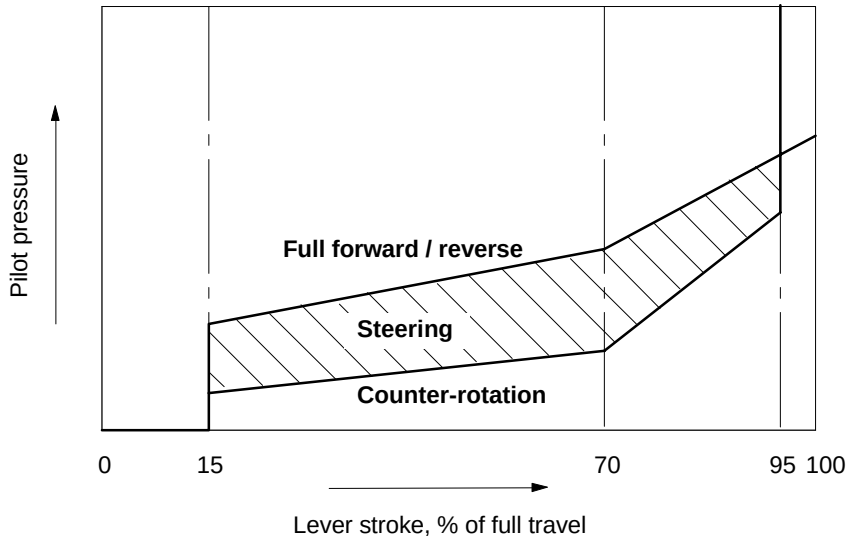
- No holes through cab for mechanical linkages.

Functional Symbol



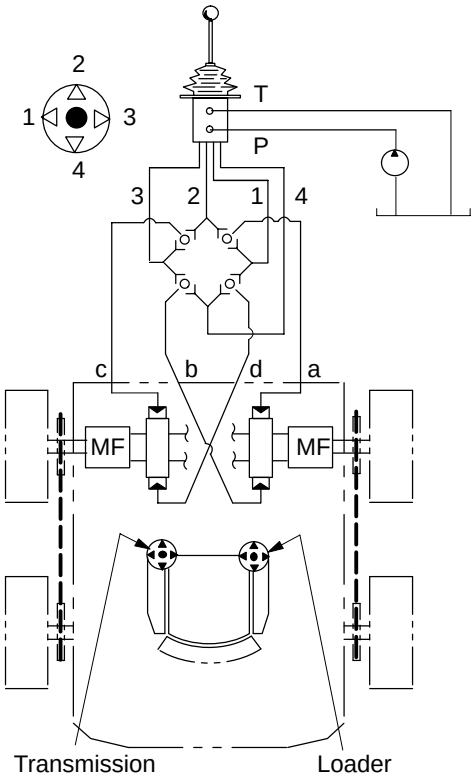
Pressure Profile Options

Example shows a typical spring capsule output combination for control of traction and steering.

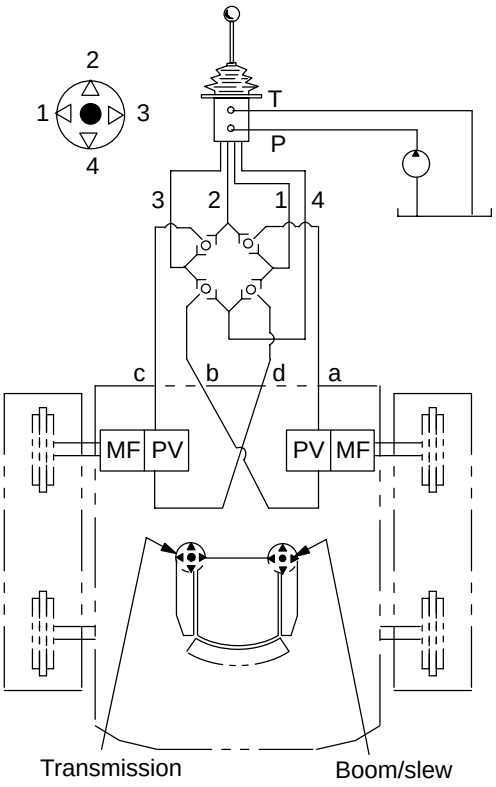


Typical Applications

HRC4-TC applied to skid-steer wheeled vehicle with valve-controlled, fixed-displacement hydraulic traction drive motors.

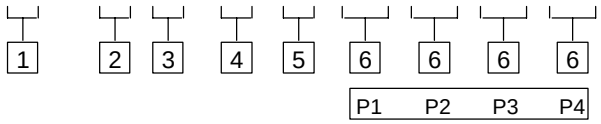


HRC4-TC applied to crawler with close-coupled hydraulic transmissions: variable-displacement pump and fixed-displacement motor.



Model Code

HRC4-TC -* -1- 3* (-*) -*** -** -*** -*** -*** -***



1 Port connection options

B = G1/4″ (BSPF, ISO 228) round mounting flange ■
S = SAE6 (9/16″-18 UNF-2B) round mounting flange ■
M = Metric (ISO 6149) M14 square mounting flange
N = Metric (ISO 6149) M14 round mounting flange ■
Q = G1/4″ (BSPF, ISO 228) square mounting flange
X = SAE6 (9/16″-18 UNF-2B) square mounting flange

■ *Not available with handle option "X*".*

2 Design number, 30 series

Subject to change, Installation dimensions unaltered for design numbers 30-39 inclusive.

3 Special suffix

(Not required for standard models)
Contact your sales representative for details

4 Actuator options (add "L" or "R" after option to define cranked actuator)

B = Handle with plastic knob, straight
BS = Actuator with straight plastic handle

With anatomic handle

C = Standard
P = 2 position non-detented rocker switch and side mounted push button
R = 3 position detented rocker switch

With ergonomic handle

X = Standard
XA = Single push button
XAP = Single push button
XB = Two push buttons
XD = Three push buttons
XDP = Three push buttons
XF = Four push buttons
XH = Five push buttons
XK = Four push buttons (option "XD" + single push button on front)
XKP = Four push buttons (option "XD" + single push button on front)
XN = Single push button on front
XT = Five push buttons (option "XH", but with dual common conductors)
XZ = Two push buttons (one each on opposite faces)
XZP = Two push buttons (one each on opposite faces)

***P= High power switch in position 1.*

See pages 37–38 for pictorial view of handle options.

5 Extra features (multiple features may be defined by adding option numbers together)

00 = None
01 = Stroke adjuster
64 = Heavy return springs

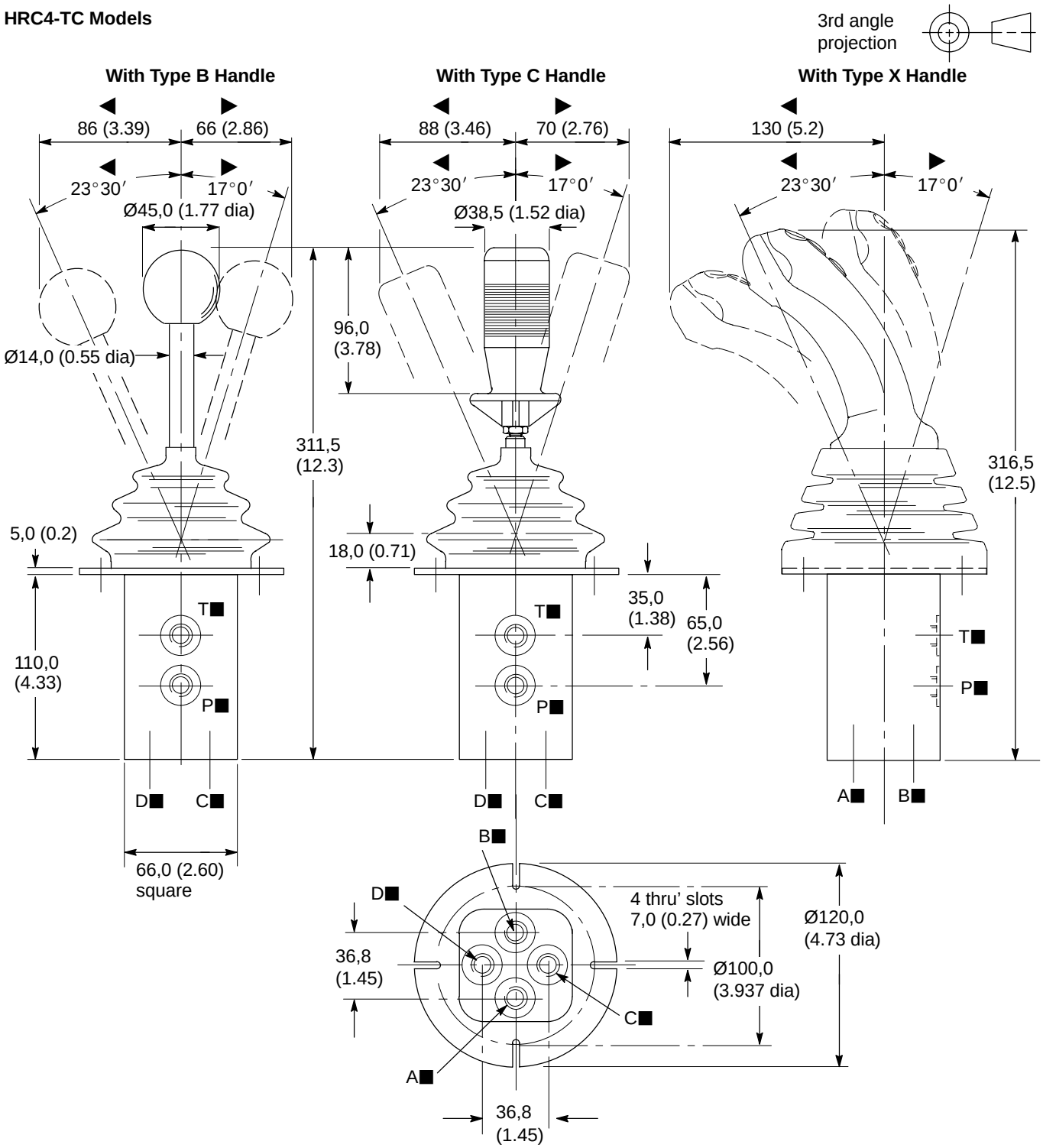
6 Control port output characteristics

B** = Proportional with forced terminal rise
C** = Proportional without forced terminal rise
D** = Proportional with gain change but without forced terminal rise
E** = Proportional with gain change and with forced terminal rise

See pages 39 and 40 for detailed pressure profiles.

Installation Dimensions in mm (inches)

HRC4-TC Models



■ Port options. Max. connection torque 30 Nm (260 lbf ft)

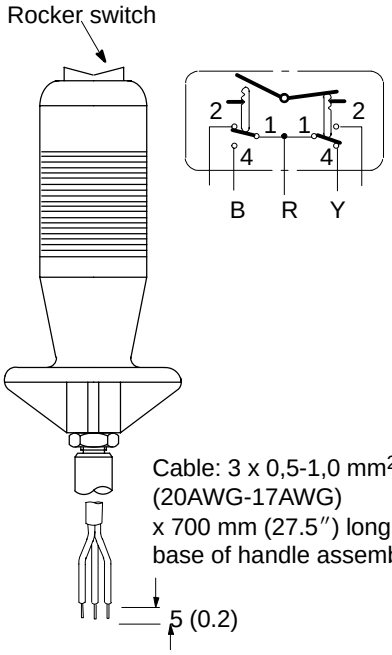
Model	Port Tapping
HRC4-TC-B/Q	$G^1/_4''$ (BSPF, ISO 228) x 12 (0.47) deep
HRC4-TC-S/X	SAE 6, $^9/_{16}''$-18 UNF x 13 (0.51) deep
HRC4-TC-M/N	M14 (ISO 6149)

From neutral position, data for:
◀ *Simultaneous-action mode.*
▶ *Single-action mode.*

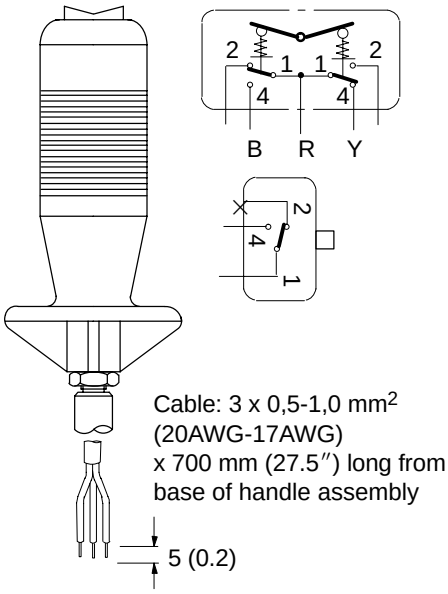
Options for Anatomic Handles

Anatomic Handles: Switch Arrangements

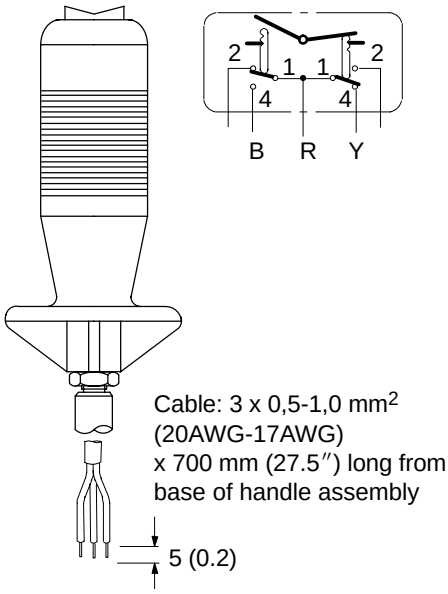
Type E:
2-Position Detented Rocker Switch



Type P:
2-Position Detented Rocker Switch and Side Mounted Push Button



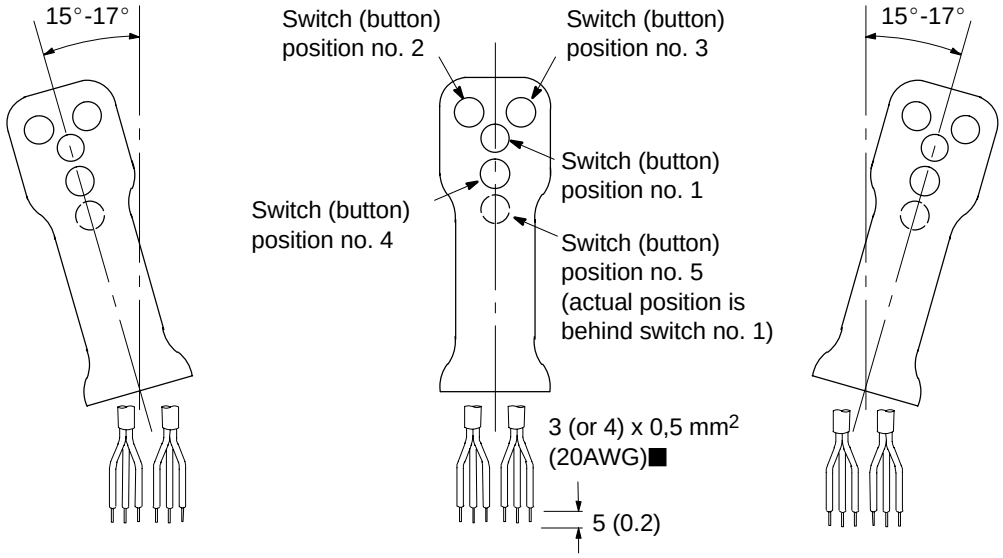
Type R:
3-Position Detented Rocker Switch



Options for Ergonomic Handles

Switch Arrangements

Diagrammatic arrangement of switch (button) locations and wiring



Type X*(P)L **Type X*(P)** **Type X*(P)R**

■ *1 or 2 cables according to switch configuration, 3 (or 4) x 0,5 mm^2 (20AWG)*
Cable length according to number of switches:
1 or 2 switches: 700 mm (27.5″) long from base of handle assembly.
3 to 5 switches: 750 mm (29.5″) long from base of handle assembly.

Switch and Wiring Configurations

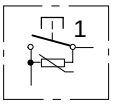
Wiring Color Key

B = Blue wire
B2 = Blue wire/numeral 2
R = Red wire
R1 = Red wire/numeral 1
Y = Yellow wire
YB = Yellow wire/black sleeve

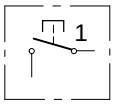
Switch 1 Options, See “Model Codes”

The circuit/connection diagrams show the standard switch in position 1. For the “X*P” option, switch 1 is as shown below.

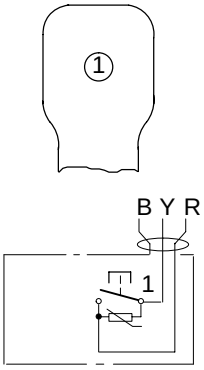
Standard switch



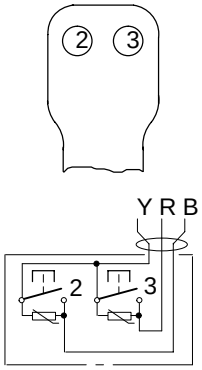
High power switch, “X***P**” option



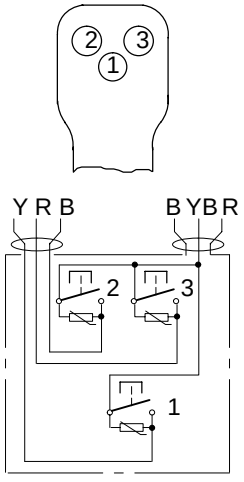
Type XA & XAP



Type XB

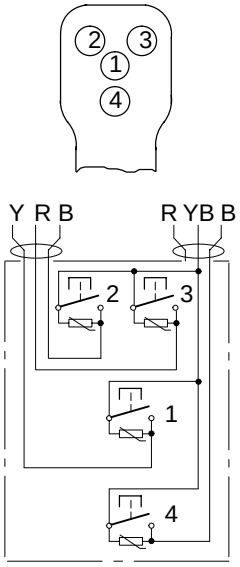


Type XD & XDP

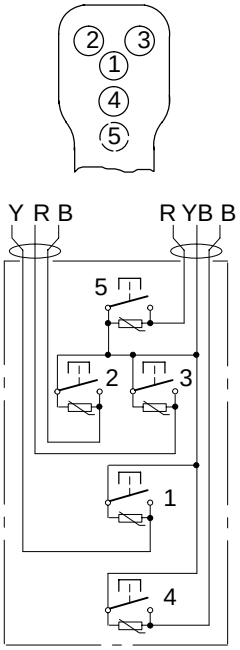


Ergonomic Handle, Type X*(P)*: Switch and Wiring Configurations

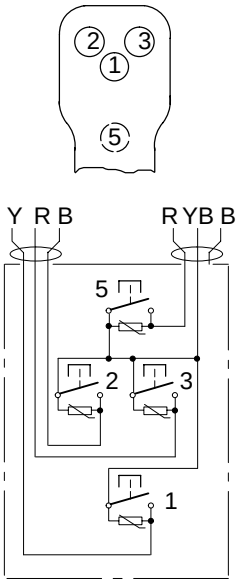
Type XF



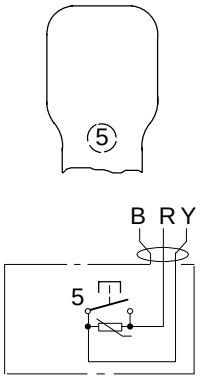
Type XH



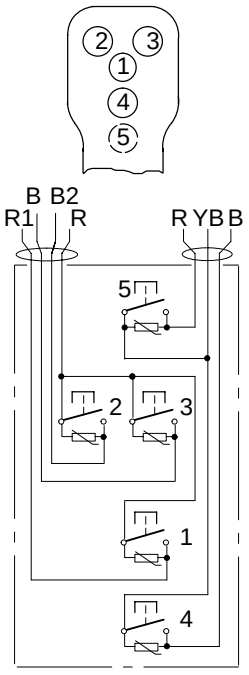
Type XK & XKP



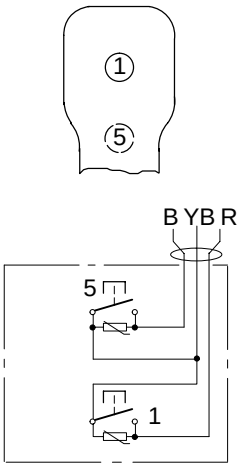
Type XN



Type XT



Type XZ & XZP

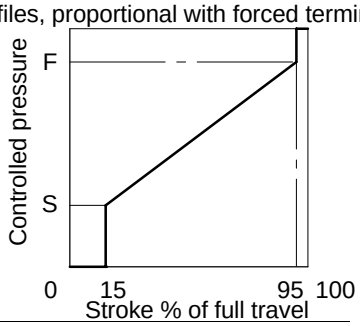


Pressure Profile Characteristics
All Models

Pressure Profile Options

Typical profiles shown below but others can be made available.

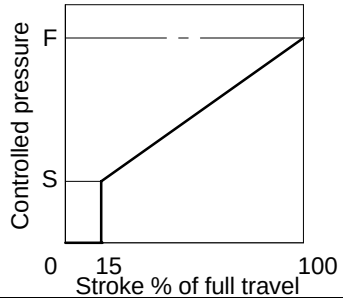
B** profiles, proportional with forced terminal rise



Code	Pressure Datums, bar (psi) S	F
B00	5,8 (85.3)	20,5 (301.4)
B01	1,0 (14.7)	45,0 (661.5)
B02	2,0 (29.4)	70,0 (1029.0)
B03	3,5 (51.5)	21,5 (316.1)
B04	6,0 (88.2)	26,0 (382.2)
B05	5,8 (85.3)	16,0 (235.2)
B06	2,0 (29.4)	8,0 (117.6)
B07	4,4 (64.7)	16,0 (235.2)
B08◆	9,8 (144.1)	23,0 (338.1)
B09	3,5 (51.5)	15,0 (220.5)
B10◆	12,0 (176.4)	25,0 (367.5)
B11◆	3,5 (51.5)	25,0 (367.5)
B12	8,0 (117.6)	24,0 (352.8)
B13	8,5 (125.0)	19,0 (279.3)
B15	3,5 (51.5)	26,6 (391.0)
B16◆	5,5 (80.9)	28,0 (411.6)
B17	4,0 (58.8)	22,0 (323.4)
B18	0,7 (10.3)	11,0 (161.7)
B19	4,8 (70.6)	19,5 (286.7)
B21	18,0 (264.6)	32,0 (470.4)
B22◆	4,6 (67.6)	27,6 (405.7)
B23	11,2 (164.6)	22,5 (330.8)
B24	7,6 (111.7)	22,3 (327.8)
B25	5,0 (73.5)	13,0 (191.1)
B26	5,0 (73.5)	11,0 (161.7)
B27◆	6,9 (101.4)	20,7 (304.3)
B30	5,8 (85.3)	19,0 (279.3)
B31◆	4,4 (64.7)	16,0 (235.2)
B37	5,0 (73,5)	28,1 (413.1)
B41	4,5 (66.1)	21,0 (308.7)

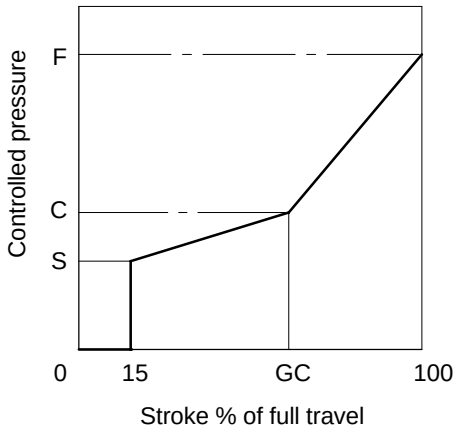
◆ *Not available on LV models. Handle stroke dimensions on installation drawings will be different when ◆ pressure capsule used due to differences in spool stroke.*

C** profiles, proportional without forced terminal rise



Code	Pressure Datums, bar (psi) S	F
C01◆	10,4 (152.9)	15,7 (230.8)
C02◆	9,8 (144.1)	23,0 (338.1)
C03	3,4 (50.0)	16,0 (235.2)
C04	3,4 (50.0)	22,5 (330.8)
C05	3,4 (50.0)	28,0 (411.6)
C06	1,0 (14.7)	20,6 (302.8)
C07	3,4 (50.0)	17,2 (252.8)
C08	3,4 (50.0)	10,3 (151.4)
C09	3,4 (50.0)	14,5 (213.2)
C10	3,5 (51.5)	24,0 (352.8)
C11	3,4 (50.0)	12,0 (176.4)
C12	4,4 (64.7)	15,5 (227.9)
C13	1,0 (14.7)	28,0 (411.6)
C14◆	6,6 (97.0)	12,4 (182.3)
C15	10,0 (147.0)	28,0 (411.6)
C16◆	8,0 (117.6)	19,0 (279.3)
C17	1,0 (14.7)	15,0 (220.5)
C18	6,0 (88.2)	27,3 (401.3)
C19◆	1,0 (14.7)	30,0 (441.0)
C20	5,5 (80.9)	21,7 (319.0)
C21	8,0 (117.6)	28,3 (416.0)
C22◆	2,0 (29.4)	9,0 (132.3)
C23	7,0 (102.9)	21,4 (314.6)
C24	7,0 (102.9)	14,0 (205.8)
C25◆	5,0 (73.5)	22,0 (323.4)
C26	8,0 (117.6)	25,0 (367.5)
C27	4,8 (70.6)	21,5 (316.1)
C28◆	13,8 (202.9)	24,0 (352.8)
C29	2,0 (29.4)	130,0 (1911.0)
C30	5,0 (73.5)	19,0 (279.3)
C31	1,0 (14.7)	11,0 (161.7)
C32	15,0 (220.5)	46,0 (676.2)
C33	7,0 (102.9)	10,0 (147.0)
C34	0,5 (7.4)	5,56 (80.9)
C35	2,0 (29.4)	8,5 (125.0)
C36	5,0 (73.5)	16,0 (235.2)
C38◆	5,0 (73.5)	16,0 (235.2)
C39◆	4,7 (69.1)	21,0 (308.7)
C41	7,0 (102.9)	19,0 (279.3)
C42	1,0 (14.7)	17,0 (249.9)
C43	2,0 (29.4)	12,0 (176.4)
C48	16,5 (242.6)	25,0 (367.5)
C49	5,5 (80.9)	23,1 (339.6)
C50	2,4 (35.3)	23,9 (351.3)
C51	3,4 (50.0)	19,3 (283.7)

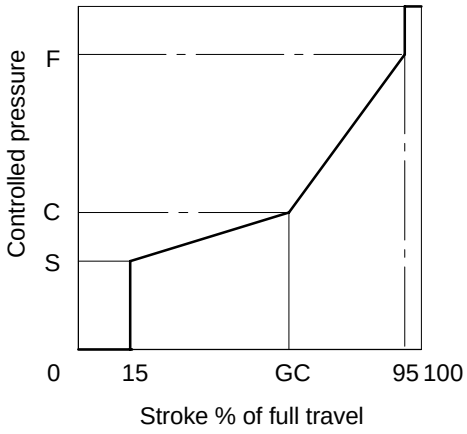
D** profiles, proportional with gain change but without forced terminal rise



Code	Pressure Datums, bar (psi)			Stroke Datum %
	S	C	F	GC
D03	5,0 (73.5)	9,0 (132.3)	23,0 (338.1)	70
D06	8,5 (125.0)	15,0 (220.5)	48,0 (705.6)	40
D07	8,5 (125.0)	15,0 (220.5)	38,0 (558.6)	40
D08	8,5 (125.0)	15,0 (220.5)	34,0 (499.8)	40
D09	1,0 (14.7)	4,0 (58.8)	11,0 (161.7)	70
D10	3,0 (44.1)	10,0 (147.0)	30,0 (441.0)	70
D12	4,4 (64.7)	7,0 (102.9)	11,9 (174.9)	70
D15	4,7 (73.5)	10,0 (14.7)	21,0 (308.7)	62
D17	8,5 (125.0)	12,8 (188.2)	27,0 (296.9)	60
D18	6,2 (91.1)	15,0 (220.5)	28,0 (411.6)	80

◆ *Not available on LV models. Handle stroke dimensions on installation drawings will be different when ◆ pressure capsule used due to differences in spool stroke.*

E** profiles, proportional with gain change and forced terminal rise

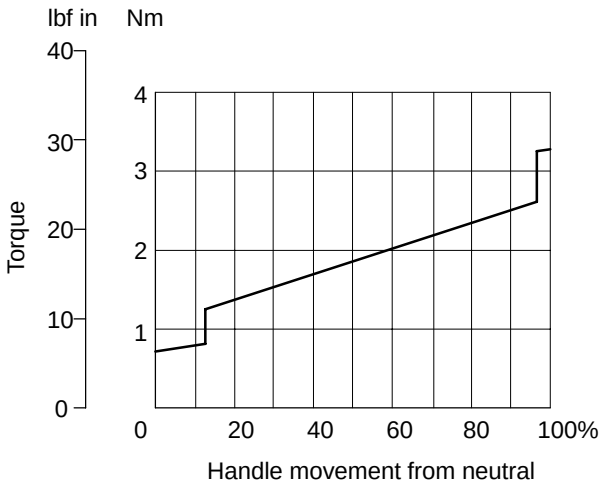


Code	Pressure Datums, bar (psi)			Stroke Datum %
	S	C	F	GC
E01	12,0 (176.4)	13,0 (191.1)	21,0 (308.7)	60
E02	8,5 (125.0)	15,0 (220.5)	32,0 (470.4)	40
E03	1,5 (22.1)	10,5 (154.4)	25,5 (374.9)	70
E04	5,7 (83.8)	8,0 (117.6)	15,5 (227.9)	65
E05	1,5 (22.1)	8,0 (117.6)	15,0 (220.5)	70
E07◆	5,5 (80.9)	16,0 (235.2)	28,0 (411.6)	63
E14	8,6 (126.4)	12,1 (177.8)	20,0 (294.0)	70

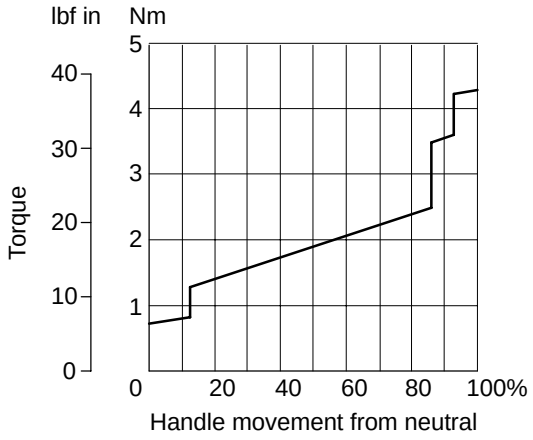
Performance Data

Typical Operating (Input) Forces

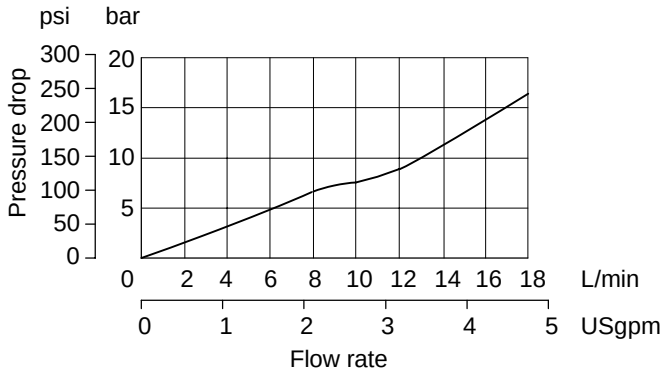
Typical Handle Loads
Standard centering spring
B00 spring capsule



Typical Handle Loads
Electromagnetic detent
Standard centering spring
B00 spring capsule



Pressure Drop, Service Port to Tank Port



Output Control Pressure

One of the key features of Hydraulic Remote Controls is their ability to provide improved operator control of the machine function by minimizing the amount of HRC actuator deadband, thus increasing the effective control range of the valve actuator lever.

In order to achieve this feature, it is necessary to size the output pressure characteristics of the Hydraulic Remote Control.

The ideal situation is to have the HRC pressure characteristic provide an initial force on the main-stage spool that will shift it to a position where the load is at the threshold of moving. This pressure is required to overcome the timing of the directional valve, and the centring spring forces in the main-stage valve. This pressure is referred to as the **initial pressure**.

The maximum output pressure is normally determined by the pressure required to move the main-stage spool to its fully shifted position. This pressure is referred to as the **final pressure**.

For design flexibility, four basic output pressure characteristic curves are available:

B** Proportional rise with a forced rise to supply pressure at the end of the actuator stroke.

C** Proportional rise without a forced rise to supply pressure at the end of the actuator stroke.

D** Proportional rise with a pressure rise gain change, and without a forced rise to supply pressure at the end of the actuator stroke.

E** Proportional rise with a pressure rise gain change, and with a forced rise to supply pressure at the end of the actuator stroke.

The released spring capsules assemblies are available in a wide range of initial and final pressure forms to allow ideal matching to the main-stage characteristics.

Please Note:
The spring capsules are factory set using computer controlled spring testing equipment and therefore we strongly recommend that you do not disassemble the units in the field, but obtain replacement capsules as and when required.

The output characteristics provide no output pressure until 2.5 degree (15%) of lever actuator has been reached. This is a **safety feature** and ensures that no functions are operated due to operator bumping the control levers.

If a separate relief valve is employed in the circuit to limit the pressure of the HRCs, it should be set at least 10 bar (140 psi) above the “final pressure” characteristic of the spring capsule. Failure to do this may result in system response problems.

Supply Flow and Typical Circuits
The supply flow requirements should be based upon the following criteria:

a) The number of simultaneous functions to be controlled.
b) The displacement of the main-stage directional control valve.
c) The shift time of the main-stage spool.

The following is a guide to sizing the required flow requirements.

Internal Leakage
The internal leakage of the products using an **SAE20 fluid** at a **temperature of 50° Celsius** (122° Farenheight), with an **inlet pressure of 40 bar** (580 psi) is as follows:
HRC4 Less than 90cc/min
(0.024 US gpm)
HRC2 Less than 45cc/min
(0.012 US gpm)
HRC1 Less than 22cc/min
(0.006 US gpm)

As these values are very low, it is unnecessary to consider them while calculating flow requirements.

Transient Flow

$$Q \text{ litres/min} = \frac{\text{Spool area } mm^2 \text{ x Spool travel } mm \text{ x } 0.006}{\text{Shift time seconds}}$$

Or

$$Q \text{ gallons/min} = \frac{\text{Spool area } in^2 \text{ x Spool travel } in \text{ x } 0.259}{\text{Shift time seconds}}$$

Total Supply Flow Required

T.S.F.R. = (Transient flow x Number of spools actuated together)

Note:
The maximum output flow from the HRC is approximately 16 L/min (4.2 USgpm)

Supply Flow From Dedicated Pump
There are various methods of supplying the flow to the Hydraulic Remote Control. The most common and generally recommended is a separate pump. In all applications, filtration of 10 μm nominal (25 μm absolute) is recommended on the supply flow to the HRC. Fluctuation of supply pump pressure will not generally cause the HRC output pressure to vary.

Supply Flow From ACX2 Pilot Pressure Supply Unit
An alternative method is to obtain the supply pressure flow from the main system when using an open center circuit. This may be achieved by using the Vickers ACX2 pilot pressure supply unit. This unit may be fitted with an optional pre-charged accumulator. The unit has the facility to be connected with two circuits (two pumps) and has integral high pressure shuttle valves.

A minimum pressure drop of 7 bar (100 psi) is required from the circuit containing the second pump (i.e. directional control valve circuit) to ensure correct operation of the ACX2 unit.

Supply Flow From SPX Valve
In a circuit where the flow is lower than 90 L/min (24 USgpm) and the working pressure is lower than 250 bar (3500 psi), the Vickers SPX priority valve with integral unloading function is an ideal choice.

This unit follows the same principles as any priority valve, in that it sends the flow to the HRC unit as its first priority, until such time as the maximum pressure is achieved. At this time the priority spool inside the SPX valve shifts to a position that allows the flow to be fed to the other services. This continues until the pressure on the HRC line reaches 5 bar (70 psi) below the maximum value, at which time the spool returns to give the priority back to the HRC valve.

When the machine functions are in a stand-by condition, the excess flow is sent directly to the reservoir with a very low pressure drop, and thus provides an energy efficient solution. In this condition the pressure in the HRC lines is maintained by the accumulator fitted to the SPX valve.

The flow taken by the SPX unit to supply the HRC circuit is very low and therefore you should not experience any interaction problems on the other services.

Safety and Energy Conservation Considerations
In some applications it may be desirable to have the controls inactive, or ensure that heat generation and pressure losses are kept to a minimum during inactive periods. This may easily be achieved by installation of a two or three way valve into the HRC control supply line to direct the pilot supply back to the reservoir at low pressure. This will prevent unintentional operation of the controls on entering or leaving the machine.

ACX2 Pilot Pressure Supply Unit

Description

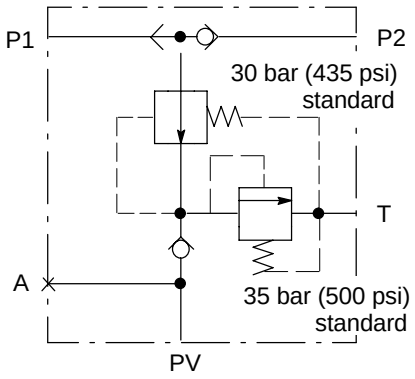
The ACX2 pilot pressure supply unit is used to feed one or more Vickers HRC or other similar hydraulic remote controls. It maintains pilot pressure within pre-set limits when inlet pressure varies above the minimum set reduced pressure.

Two parallel-connected inlet ports with integral shuttle valve allow the supply to be drawn from one or two sources.

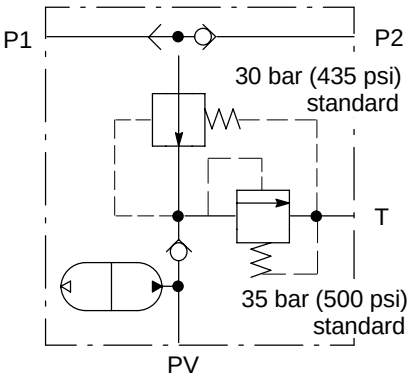
ACX2 supply units are available with or without an integral nitrogen-loaded accumulator, the latter also allowing operation for short durations when the vehicle engine is idle.

Functional Symbols

Standard models without integral accumulator



Standard models with integral accumulator



Alternative accumulator capacities available, see “Model Code”.

Model Code

ACX2- ** -B- 1*

1 2

1 Accumulator hydraulic capacity

WA= Without accumulator
35 = 0,35 litres (21 in^3)
70 = 0,70 litres (42.7 in^3)

2 Design number, 10 series

Subject to change. Installation dimensions unaltered for design numbers 10 to 19 inclusive.

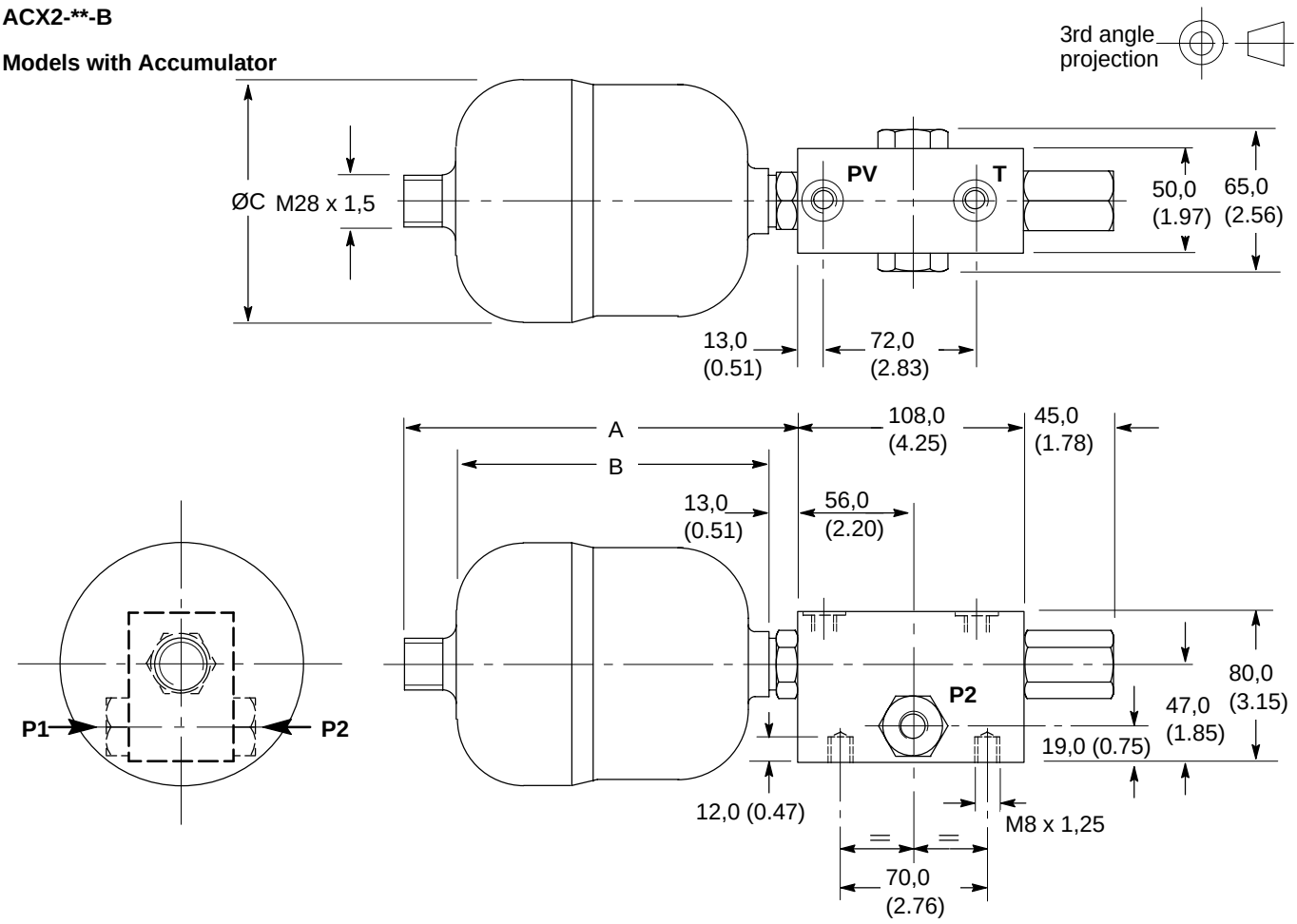
Operating Data

Maximum inlet pressure, ports P1 and P2	350 bar (5075 psi)
Standard controlled pressure limits, port PV: By reducing function By relief function	 30 bar (435 psi) 35 bar (508 psi)
Maximum permissible pressure, port PV: With integral accumulator Without integral accumulator	 100 bar (1450 psi) 150 bar (2175 psi)
Maximum pressure, port T	2 bar (29 psi)
Rated flow	25 L/min (6.6 USgpm)
Maximum transient flow rate	45 L/min (11.9 USgpm)
Accumulator characteristics: Inert gas pre-charge Standard pre-charge pressure	 Nitrogen 13 bar (188 psi)
Capacity options (at zero pressure)	See “Model Code” 1
Hydraulic fluids	Antiwear hydraulic oils or crankcase oils to SC, SD, or SE classes of SAE J183. The extreme viscosity range is from 380 to 6,4 cSt (1761 to 48 SUS) but the optimum operating range is from 40 to 16 cSt (186 to 81 SUS).
Temperature ranges: Ambient Max. fluid range	 –15° to 60°C (5° to 140°F) –15° to 80°C (5° to 176°F) **Note:** It is preferable that ACX2 units are installed away from any source of direct heat.
Filtration recommendations	ISO 4400 20/16
Installation dimensions	See next page
Mass, approx: ACX2-WA ACX2-35 ACX2-70	 1,8 kg (4.0 lb) 4,2 kg (9.3 lb) 4,8 kg (10.6 lb)
Mounting attitude, all models	Unrestricted
Installation and start-up, accumulator models	These are shipped with accumulator pre-charged with nitrogen to a specified pressure. The pre-charge should not normally need initial re-adjustment unless a different pre-charge pressure is needed for the application. If necessary, users can alter the pre-charge pressure by temporarily fitting an appropriate charging device jointly to the gas port and a nitrogen bottle, then carefully adjusting the pre-charge within appropriate limits. If the accumulator is empty of oil when starting, a back pressure of at least 8 bar (116 psi) is needed at outlet PV to assist filling with oil. This is usually attained by running the engine-driven pump(s) at high speed for 10 to 15 seconds.

Installation Dimensions in mm (inches)

ACX2--B**

Models with Accumulator



Model	A	B	C	P1, P2 & PV	T
ACX2-35-B	153 (6.03)	118 (4.65)	92 (3.63)	G$^1/_4$″ x 12 (0.47) deep	G$^3/_8$″ x 12 (0.47) deep
ACX2-70-B	194 (7.64)	142 (5.60)	116 (4.57)	G$^1/_4$″ x 12 (0.47) deep	G$^3/_8$″ x 12 (0.47) deep

Models without Accumulator

Other dimensions as above