



PROPORTIONAL DIRECTIONAL CONTOL VALVES

4/2 AND 4/3 PROPORTIONAL DIRECTIONAL CONTOL VALVES, DIRECT OPERATED, WITH ELECTRICAL POSITION FEEDBACK, WITHOUT/WITH INTEGRATED ELECTRONICS (OBE)



#### TECHNICAL DATA

GENERAL							
SIZES		Size	6	1 🗆			
WEIGHT	- TYPE 4WRE	KG	2.2	6.3			
	- TYPE 4WREE	4WREE KG 2.4		6.5			
INSTALLATION POSITION			ANY, PREFERABLY HORIZONTAL				
AMBIENT TEMPERATURE RANGE	- TYPE 4WRE	°C	-20 то +70				
	- TYPE 4WREE	°C	-20 то +50				
STORAGE TEMPERATURE RANGE		°C	-20 то +80				
$MTTF_{\mathtt{D}}$ values according to EN IS	0 13849	YEARS	1501)				
HYDRAULIC (MEASURED WITH HLP46	5) $artheta_{_{\square IL}}$ = 40 $^{\circ}$ C $\pm$ :	5 °C					
MAXIMUM OPERATING — PORT A, B	, P	BAR	315				
PRESSURE - PORT T		BAR	210				
RATED FLOW $oldsymbol{q}_{ ext{V RATED}}$ with $oldsymbol{\Delta p}=1\square$ bar L/min			4, 8, 16, 32	25, 50, 75			
RECOMMENDED MAXIMUM FLOW L/MIN			80 180				
HYDRAULIG FLUID		SEE TABLE BELOW					
HYDRAULIC FLUID TEMPERATURE RAN	°C	-20 TO +80 (PREFERABLY +40 TO +50)					
VISCOSITY RANGE			20 TO 380 (PREFERABLY 30 TO 46)				
MAXIMUM ADMISSIBLE DEGREE OF CO HYDRAULIC FLUID, CLEANLINESS CLAS TO ISO 4406 (C)	Ē	CLASS 20/18/15 <sup>2)</sup>					
HYSTERESIS %			≤0.1				
RANGE OF INVERSION %			≤0.05				
RESPONSE SENSITIVITY %			≤0.05				
ZERO SHIFT UPON CHANGE OF HYDRAULIC %/10 K			≤0.15				
FLUID TEMPERATURE AND OPERATING	OO BAR	≤0.1					

<sup>1)</sup> WITH CONTROL SPOOL TYPES E, E1, EA, W, W1, WA; IN LONGITUDINAL CONTROL SPOOL DIRECTION, THERE IS SUFFICIENT POSITIVE OVERLAP WITHOUT SHOCK/VIBRATION LOAD; OBSERVE THE INSTALLATION ORIENTATION WITH REGARD TO THE MAIN DIRECTION OF ACCELERATION.

<sup>2)</sup> THE CLEANLINESS CLASSES SPECIFIED FOR THE COMPONENTS MUST BE ADHERED TO IN HYDRAULIC SYSTEMS. EFFECTIVE FILTRATION PREVENTS FAULTS AND AT THE SAME TIME INCREASES THE SERVICE LIFE OF THE COMPONENTS.

HYDRAULIC FLUID	CLASSIFICATION	SUITABLE SEALING	STANDARDS
MINERAL OILS AND RELATED HYDROCARBONS	HL, HLP	NBR, FKM	DIN 51524
FLAME-RESISTANT — CONTAINING WATER	HFC (FUCHS HYDROTHERM 46M, PETROFER ULTRA SAFE 620)	NBR	ISO 12922



#### PROPORTIONAL DIRECTIONAL CONTOL VALVES

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#### TECHNICAL DATA

ELECTRIC							
Size	Size	6 10					
VOLTAGE TYPE		DIRECT VOLTAGE					
SOLENOID COIL	$-$ Cold value at 20 $^{\circ}$ C $\Omega$	2.65 4.55					
RESISTANCE	– MAXIMUM HOT VALUE $\Omega$	4.05	6.82				
DUTY CYCLE	%	100					
MAXIMUM COIL TEMP	erature <sup>1)</sup> °C	ир то 150					
ELECTRICAL CONNEC		WITH CONNECTOR ACCORDING TO DIN EN 175301-803 AND ISO 4400					
	- TYPE 4WREE	WITH CONNECTOR DIN EN 175201-804					
PROTECTION CLASS TO EN 60529	OF THE VALVE ACCORDING	IP65 WITH MATING CONNECTOR M	OUNTED AND LOCKED				
CONTROL ELEC	TRONICS						
TYPE 4WRE	4/3 VERSION						
	AMPLIFIER IN DIGITAL	VT-VRPD-2-2X/VO/O ACCORDING TO RE 30126					
	EURO-CARD FORMAT 2) ANALOG	VT-VRPA2-1-1X/V0 VT-VRPA2-2-1X/V ACCORDING TO ACCORDING TO DATA SHEET 30119 DATA SHEET 3011					
	MODULE AMPLIFIER 2) ANALOG	VT-MRPA2-1 ACCORDING TO DATA SHEET 30219	VT-MRPA2-2 ACCORDING TO DATA SHEET 30219				
TYPE4WREA	4/2 VERSION	VT-MRPA 1 - 1	VT-MRPA1-2				
	MODULE AMPLIFIER 2) ANALOG	ACCORDING TO DATA SHEET 30219	ACCORDING TO DATA SHEET 30219				
TYPE 4WREE		INTEGRATED IN THE VALVE, SEE PAGE 9					
	ANALOG COMMAND VALUE MODULE	VT- SWMA-1-1X/ ACCORDING TO DATA SHEET 29902					
	ANALOG COMMAND VALUE MODULE	VT-SWMAK-1-1X/ ACCORDING TO DATA SHEET 29903					
	ANALOG COMMAND VALUE GARD	VT-SWKA-1-1X/ ACCORDING TO DATA SHEET 30255					
	DIGITAL COMMAND VALUE CARD	VT-HACD -1-1X/ ACCORDING TO DATA SHEET 30143					
SUPPLY VOLTAGE	Nominal voltage VDC	24					
	LOWER LIMIT VALUE V	19.4					
	UPPER LIMIT VALUE V	35					
CURRENT CONSUMPTION	I <sub>MAX</sub> A	< 2					
OF THE AMPLIFIER	Pulse current A	3					

<sup>1)</sup> DUE TO THE TEMPERATURES OCCURRING AT THE URFACES OF THE SOLENOID COILS,

THE EUROPEAN STANDARDS ISO 13732-1 AND EN ISO 4413 NEED TO BE ADHERED TO.

#### F IMPORTANT INFORMATION ON HYDRAULIC FLUIDS

- FOR MORE INFORMATION AND DATA ON THE USE OF OTHER HYDRAULIC FLUIDS CONTACT US.
- THERE MAY BE LIMITATIONS REGARDING THE TECHNICAL VALVE DATA (TEMPERATURE, PRESSURE RANGE, SERVICE LIFE, MAINTENANCE INTERVALS, ETC.).
- THE FLASH POINT OF THE PROCESS AND OPERATING MEDIUM USED MUST BE 40 K HIGHER THAN THE MAXIMUM SOLENOID SURFACE TEMPERATURE.

#### ( Notice:

FOR INFORMATION ON THE ENVIRONMENTAL SIMULATION TESTING FOR THE AREAS EMC (ELECTROMAGNETIC COMPATIBILITY), CLIMATE AND MECHANICAL LOAD SEE DATA SHEET 29061-U (DECLARATION ON ENVIRONMENTAL COMPATIBILITY).

#### - FLAME-RESISTANT - WATER-CONTAINING:

MAXIMUM PRESSURE DIFFERENTIAL PER CONTROL EDGE 175 BAR.

Pressure pre-loading at the tank port > 20~% of the pressure differential; other- wise, increased cavitation.

LIFE CYCLE AS COMPARED TO OPERATION WITH MINERAL OIL HL, HLP 50 % To 100 %.





PROPORTIONAL DIRECTIONAL CONTOL VALVES

#### TECHNICAL DATA

#### TYPE 4WRE ...-2X/...

THE 4/2 AND 4/3 PROPORTIONAL DIRECTIONAL VALVES ARE DESIGNED AS DIRECT OPERATED DEVICES IN PLATE DESIGN. OPERATION IS EFFECTED BY PROPORTIONAL SOLENOIDS WITH CENTRAL THREAD AND DETACHABLE COIL. THE SOLENOIDS ARE CONTROLLED BY EXTERNAL ELECTRONICS.

#### SET-UP:

THE VALVE BASICALLY CONSISTS OF:

- HOUSING (1) WITH CONNECTION SURFACE
- CONTROL SPOOL (2) WITH COMPRESSION SPRINGS (3 AND 4) AND SPRING PLATE (5 AND 6)
- SOLENDIDS (7 AND 8) WITH CENTRAL THREAD
- Position transducer (9)

#### FIMPORTANT NOTE

THE PG FITTING (11) MUST NOT BE OPENED. MECHANICAL ADJUSTMENT OF THE ADJUSTMENT NUT LOCATED BELOW IS PROHIBITED AND DAMAGES THE VALVE.

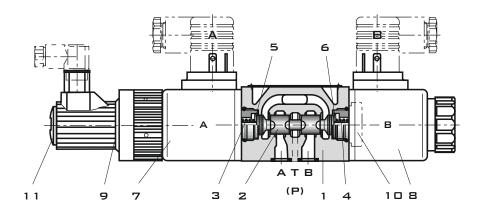
#### FUNCTION:

- WITH DE-ENERGIZED SOLENOIDS (7 AND 8), CENTRAL POSITION OF THE CONTROL SPOOL (2) BY COMPRESSION SPRINGS (3 AND 4) BETWEEN SPRING PLATES (5 AND 6)
- DIRECT OPERATION OF THE CONTROL SPOOL (2) BY CONTROLLING A PROPORTIONAL SOLENDID, E.G., SOLENDID "B" (8)
  - ightarrow Displacement of the control spool (2) to the Left proportional to the electric input signal
  - → CONNECTION FROM P TO A AND B TO T VIA ORIFICE-TYPE

    CROSS-SECTIONS WITH PROGRESSIVE FLOW CHARACTERISTIC
- SWITCHING OFF OF THE SOLENOID (8)
  - ightarrow THE COMPRESSION SPRING (3) BRINGS THE CONTROL SPOOL (2) BACK INTO THE CENTRAL POSITION

IN THE DE-ENERGIZED CONDITION, THE CONTROL SPOOL (2) IS HELD IN A MECHANICAL CENTRAL POSITION BY THE RETURN SPRINGS. WITH CONTROL SPOOL SYMBOL "V", THIS POSITION DOES NOT CORRESPOND TO THE HYDRAULIC CENTRAL POSITION.

WHEN THE ELECTRIC VALVE CONTROL LOOP IS CLOSED, THE CONTROL SPOOL IS POSITIONED IN THE HYDRAULIC CENTRAL POSITION.



#### VALVE WITH 2 SPOOL POSITIONS: (TYPE 4WRE...A...)

The function of this valve design basically corresponds to the valve with three spool positions. The 2 spool position valves are, however, only equipped with solenoid "a" (7). Instead of the 2nd proportional solenoid, there is a plug screw (10).

#### **₽** Notice

DUE TO THE DESIGN PRINCIPLE, INTERNAL LEAKAGE IS INHERENT TO THE VALVES, WHICH MAY INCREASE OVER THE LIFE CYCLE.

#### **☞** Notice

THE TANK LINE MUST NOT BE ALLOWED TO RUN EMPTY. WITH CORRESPONDING INSTALLATION CONDITIONS, A PRE-CHARGE VALVE (PRE-CHARGING PRESSURE APPROX. 2 BAR) IS TO BE INSTALLED.



#### PROPORTIONAL DIRECTIONAL CONTOL VALVES

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#### TECHNICAL DATA

#### TYPE 4WREE ...-2X/...

THE 4/2 AND 4/3 PROPORTIONAL DIRECTIONAL VALVES ARE DESIGNED AS DIRECT OPERATED DEVICES IN PLATE DESIGN.

OPERATION IS EF-FECTED BY PROPORTIONAL SOLENOIDS WITH CENTRAL THREAD AND DE-TACHABLE COIL. THE SOLENOIDS ARE CONTROLLED BY THE INTERNAL ELECTRONICS.

#### SET-UP:

THE VALVE BASICALLY CONSISTS OF:

- Housing (1) with connection surface
- CONTROL SPOOL (2) WITH COMPRESSION SPRINGS (3 AND 4 AND SPRING PLATE (5 AND 6)
- SOLENDIDS (7 AND 8) WITH CENTRAL THREAD
- POSITION TRANSDUCER (9)
- INTEGRATED ELECTRONICS (13)
- ELECTRIC ZERO POINT ADJUSTMENT (12) ACCESSIBLE VIA PG7

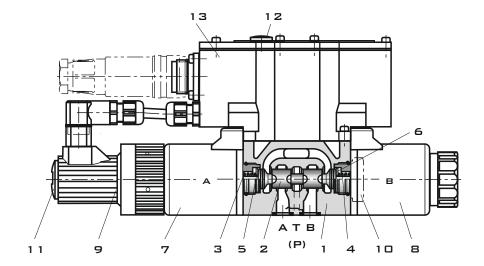
#### FIMPORTANT NOTE

THE PG FITTING (11) MUST NOT BE OPENED. MECHANICAL AD-JUSTMENT OF THE ADJUSTMENT NUT LOCATED BELOW IS PROHIBITEDAND DAMAGES THE VALVE.

#### FUNCTION:

- WITH DE-ENERGIZED SOLENOIDS (7 AND 8), CENTRAL POSITION OF THE CONTROL SPOOL (2) BY COMPRESSION SPRINGS (3 AND 4) BETWEEN SPRING PLATES (5 AND 6)
- DIRECT OPERATION OF THE CONTROL SPOOL (2) BY CONTROLLING A PRO-PORTIONAL SOLENOID, E.G. SOLENOID "B" (8)
  - → DISPLACEMENT OF THE CONTROL SPOOL (2) TO THE LEFT PROPOR-TIONAL TO THE ELECTRIC INPUT SIGNAL
  - → CONNECTION FROM P TO A AND B TO T VIA ORIFICE-TYPE CROSS-SECTIONS WITH PROGRESSIVE FLOW CHARACTERISTIC
- SWITCHING OFF OF THE SOLENOID (8)
  - ightarrow The compression spring (3) brings the control spool (2)back into the central position

IN THE DE-ENERGIZED CONDITION, THE CONTROL SPOOL (2) IS HELD IN A MECHANICAL CENTRAL POSITION BY THE RETURN SPRINGS. WITH CON-TROL SPOOL SYMBOL "V", THIS POSITION DOES NOT CORRESPOND TO THE HYDRAULIC CENTRAL POSITION. WHEN THE ELECTRIC VALVE CONTROL LOOP IS CLOSED, THE CONTROL SPOOL IS POSITIONED IN THE HYDRAULIC CEN-TRAL POSITION.



#### VALVE WITH 2 SPOOL POSITIONS: (TYPE 4WREE...A...)

THE FUNCTION OF THIS VALVE DESIGN BASICALLY CORRESPONDS TO THE VALVE WITH THREE SPOOL POSITIONS. THE 2 SPOOL POSITION VALVES ARE, HOWEVER, ONLY EQUIPPED WITH SOLENOID "A" (7). INSTEAD OF THE 2ND PROPORTIONAL SOLENOID, THERE IS A PLUG SCREW (10).

#### P NOTICE

DUE TO THE DESIGN PRINCIPLE, INTERNAL LEAKAGE IS INHERENT TO THE VALVES, WHICH MAY INCREASE OVER THE LIFE CYCLE.

#### T NOTICE

The tank line must not be allowed to run empty. With cor-responding installation conditions, a pre-charge valve (pre-charging pressure approx.  $2\ \text{Bar}$ ) is to be installed.





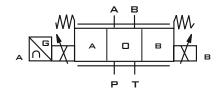
PROPORTIONAL DIRECTIONAL CONTOL VALVES

#### SCHEMES

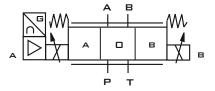
PROPORTIONAL DIRECTIONAL VALVE WITHOUT INTEGRATED ELECTRONICS

PROPORTIONAL DIRECTIONAL VALVE WITH INTEGRATED ELECTRONICS

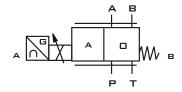
#### TYPE 4WRE...



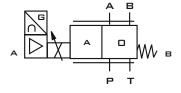
#### TYPE 4WREE...



#### TYPE 4WRE...A...



#### TYPE 4WREE...A...





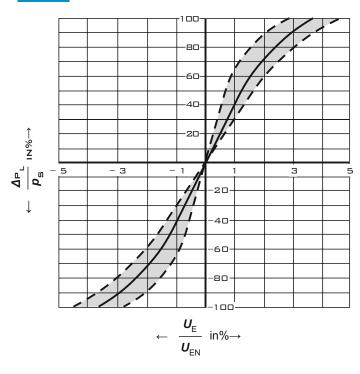


#### PROPORTIONAL DIRECTIONAL CONTOL VALVES

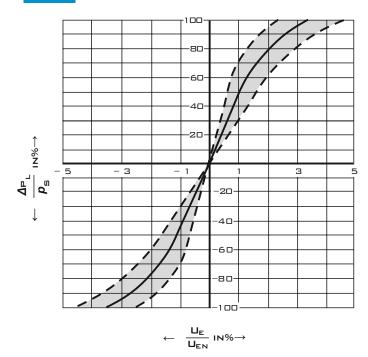
## CHARACTERISTIC CURVES: TYPE 4WREE

Pressure signal characteristic curve (control spool V),  $\rm P_{\rm s} = ~100~Bar$ 

#### SIZE 6



#### SIZE 10



MEASURED WITH HLP46, VISCOSITY oil = 40 °C  $\pm$  5 °C and p = 100 bar

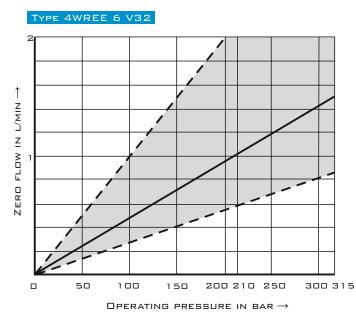


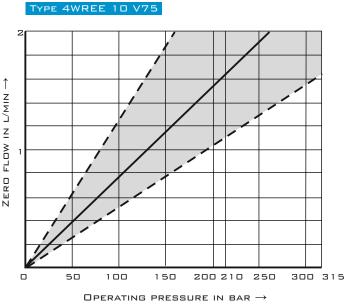


PROPORTIONAL DIRECTIONAL CONTOL VALVES

#### CHARACTERISTIC CURVES: TYPE 4WREE

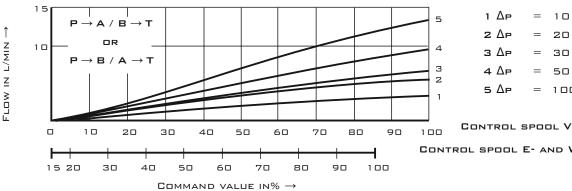
ZERO FLOW WITH CENTRAL CONTROL SPOOL POSITION





#### TYPE 4WREE 6

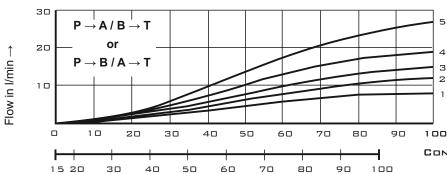
4 L/MIN RATED FLOW WITH 10 BAR VALVE PRESSURE DIFFERENTIAL





= 100 BAR CONSTANT

CONTROL SPOOL E- AND W



1 ∆₽ 10 BAR CONSTANT

2 Ap 20 BAR CONSTANT 30 BAR CONSTANT

4 ∆p 50 BAR CONSTANT

5 ∆p 100 BAR CONSTANT

CONTROL SPOOL V 100

CONTROL SPOOL E- AND W

COMMAND VALUE IN% ightarrow

MEASURED WITH HLP46, VISCOSITY oil = 40  $^{\circ}$ C  $\pm$  5  $^{\circ}$ C and p = 100 bar

80



#### PROPORTIONAL DIRECTIONAL CONTOL VALVES

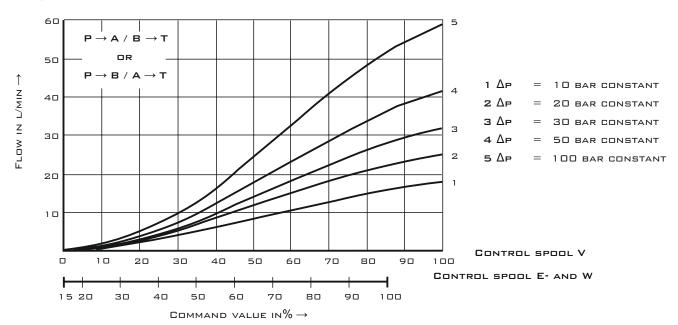
## PROPORZIONALI DISTRIBUTORI



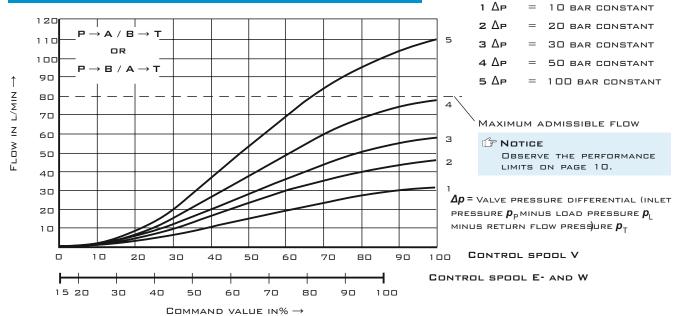
#### CHARACTERISTIC CURVES: TYPE 4WREE

#### TYPE 4WREE 6

16 L/MIN RATED FLOW WITH 10 BAR VALVE PRESSURE DIFFERENTIAL





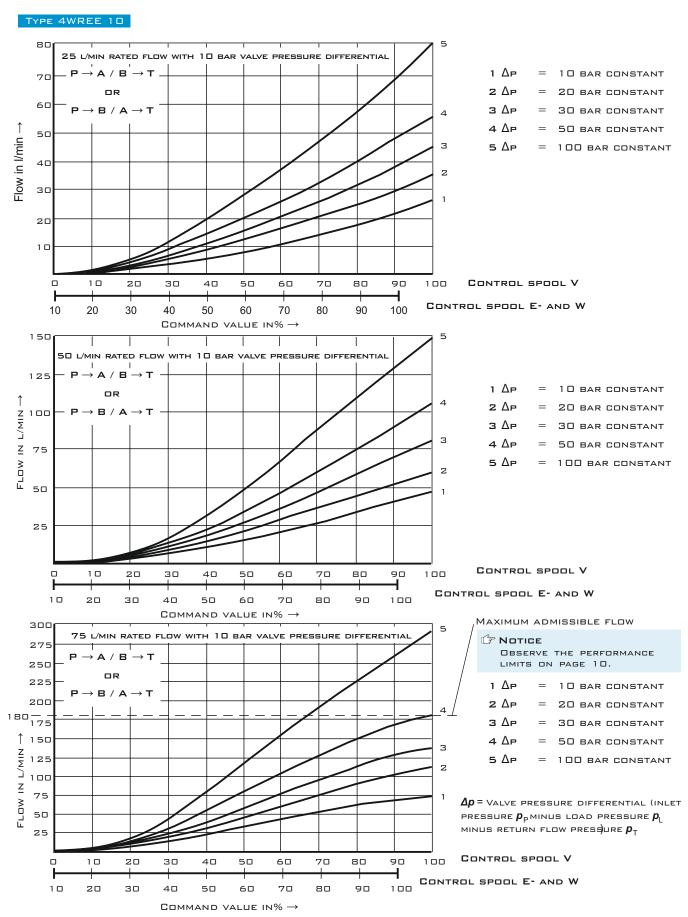


MEASURED WITH HLP46, VISCOSITY oil = 40  $^{\circ}$ C  $\pm$  5  $^{\circ}$ C and p = 100 bar





PROPORTIONAL DIRECTIONAL CONTOL VALVES







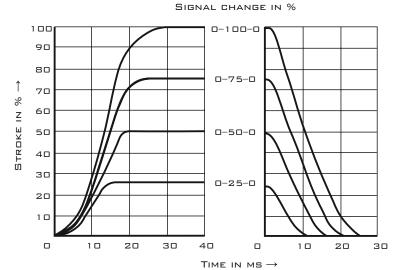
#### PROPORTIONAL DIRECTIONAL CONTOL VALVES

#### CHARACTERISTIC CURVES: TYPE 4WREE

#### TRANSITION FUNCTION WITH STEPPED ELECTRIC INPUT SIGNALS: SIZE 6

4/3 VALVE VERSION

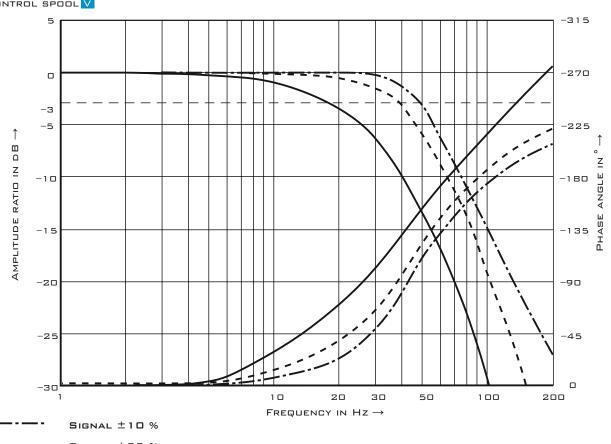
CONTROL SPOOL E



FREQUENCY RESPONSE CHARACTERISTIC CURVES: SIZE 6

4/3 VALVE VERSION

CONTROL SPOOL V



SIGNAL ±25 %

SIGNAL ±100 %

MEASURED WITH HLP46, VISCOSITY  $^{\circ}$ L = 40  $^{\circ}$ C  $\pm$  5  $^{\circ}$ C and p = 10 bar





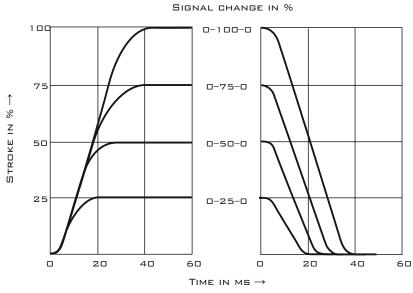
PROPORTIONAL DIRECTIONAL CONTOL VALVES

#### CHARACTERISTIC CURVES: TYPE 4WREE

#### TRANSITION FUNCTION WITH STEPPED ELECTRIC INPUT SIGNALS: SIZE 10

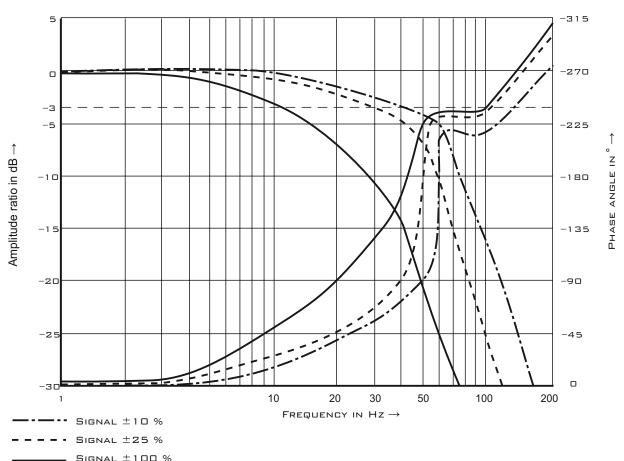


CONTROL SPOOL E



#### FREQUENCY RESPONSE CHARACTERISTIC CURVES: SIZE 10

4/3 VALVE VERSION CONTROL SPOOL V



SIGNAL ±100 %

MEASURED WITH HLP46, VISCOSITY = 40  $^{\circ}$ C  $\pm$  5  $^{\circ}$ C and p = 10 bar





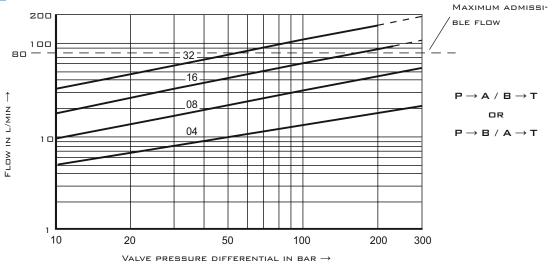
PROPORTIONAL DIRECTIONAL CONTOL VALVES

#### CHARACTERISTIC CURVES: TYPE 4WREE

LOAD FUNCTION WITH MAXIMUM VALVE OPENING: SIZE 6

RATED FLOW 4, 8, 16 AND 32 L/MIN

CONTROL SPOOL V

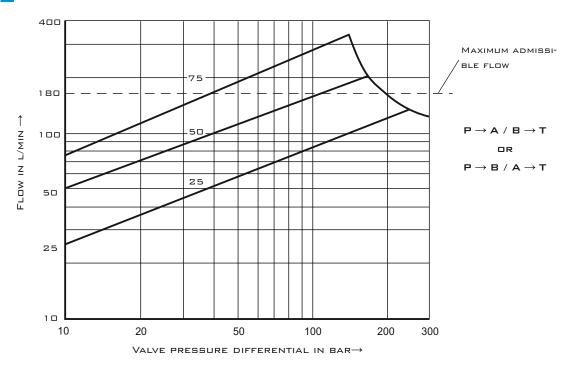


Observe the maximum admissible flow of 80 L/min.

LOAD FUNCTION WITH MAXIMUM VALVE OPENING: SIZE 10

RATED FLOW 25, 50 AND 75 L/MIN

CONTROL SPOOL V



OBSERVE THE MAXIMUM ADMISSIBLE FLOW OF 180 L/MIN.

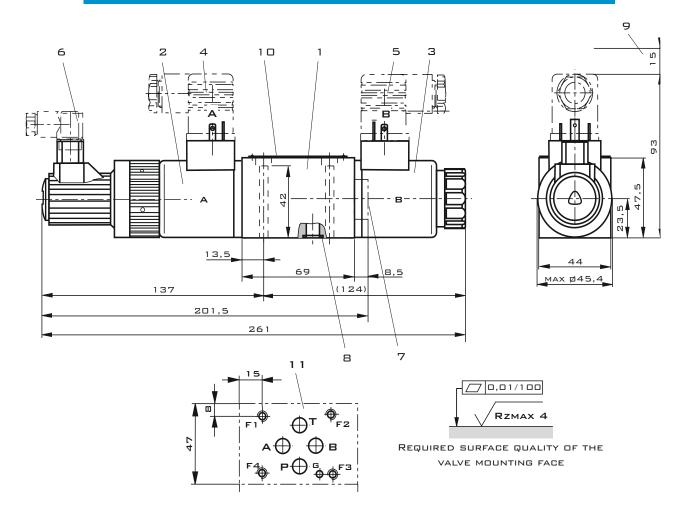
MEASURED WITH HLP46, VISCOSITY oil = 40  $^{\circ}$ C  $\pm$  5  $^{\circ}$ C





PROPORTIONAL DIRECTIONAL CONTOL VALVES

#### INSTALLATION DIMENSIONS: TYPE 4WRE (SIZE 6)



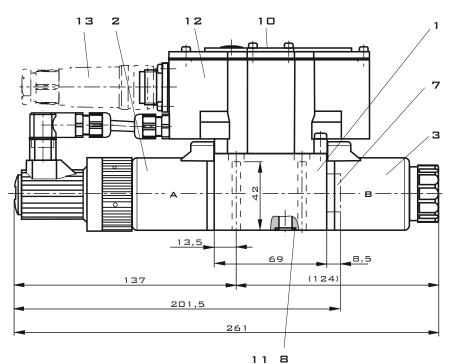
- 1 VALVE HOUSING
- 2 PROPORTIONAL SOLENOID "A" WITH INDUCTIVE POSITION TRANSDUCER
- 3 PROPORTIONAL SOLENOID "B"
- 4 MATING CONNECTOR "A", COLOR GRAY, SEPARATE ORDER SEE PAGE 18
- 5 MATING CONNECTOR "B", COLOR BLACK, SEPARATE ORDER - SEE PAGE 18
- 6 MATING CONNECTOR FOR INDUCTIVE POSITION TRANSDUCER, SEPARATE ORDER SEE PAGE 18
- 7 PLUG SCREW FOR VALVE WITH ONE SOLENOID (2 SPOOL POSITIONS, VERSION EA OR WA)
- 8 IDENTICAL SEAL RINGS FOR PORTS A, B, P, AND T
- 9 SPACE REQUIRED TO REMOVE THE MATING CONNECTOR
- 10 NAME PLATE
- 11 MACHINED VALVE MOUNTING FACE,
  PORTING PATTERN ACCORDING TO ISO 4401-03-02-0-05
  (WITH LOCATING HOLE)
  - DEVIATING FROM THE STANDARD:
  - WITHOUT LOCATING HOLE "G"
  - PORTS P, A, B AND T WITH  $\not \square$  8 MM

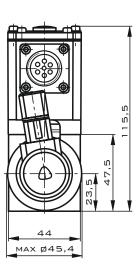


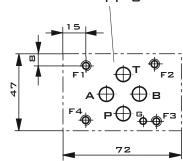


#### PROPORTIONAL DIRECTIONAL CONTOL VALVES

#### INSTALLATION DIMENSIONS: TYPE 4WREE (SIZE 6)









REQUIRED SURFACE QUALITY OF THE VALVE MOUNTING FACE

GENERAL TOLERANCES ACCORDING TO ISO 2768-MK

- 1 VALVE HOUSING
- 2 PROPORTIONAL SOLENOID "A" WITH INDUCTIVE POSITION TRANSDUCER
- 3 PROPORTIONAL SOLENOID "B"
- 7 PLUG SCREW FOR VALVE WITH ONE SOLENOID
  (2 SPOOL POSITIONS, VERSION EA OR WA)
- 8 IDENTICAL SEAL RINGS FOR PORTS A, B, P, AND T
- 10 NAME PLATE
- 1 1 MACHINED VALVE MOUNTING FACE,

PORTING PATTERN ACCORDING TO ISO 4401-03-02-0-05 (WITH LOCATING HOLE)

DEVIATING FROM THE STANDARD:

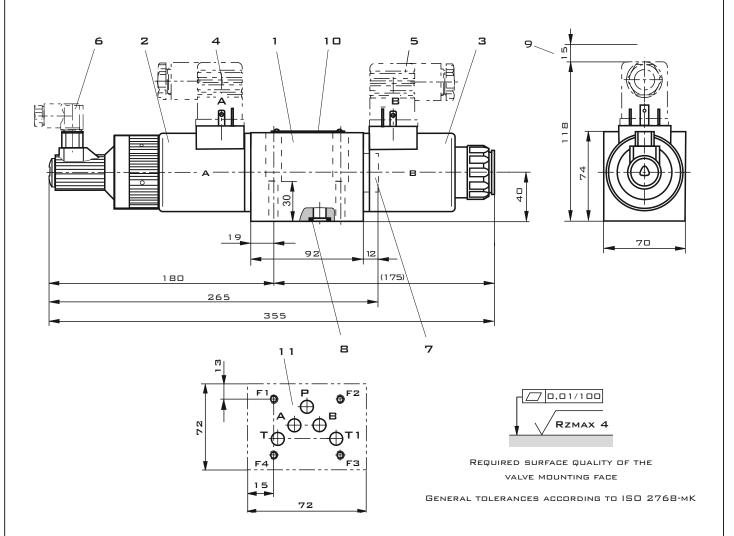
- WITHOUT LOCATING HOLE  ${}^{\shortparallel}G^{\shortparallel}$
- PORTS P, A, B AND T WITH  $\not \square$  8 MM
- 12 INTEGRATED ELECTRONICS (OBE)
- 13 MATING CONNECTOR,
  SEPARATE ORDER SEE PAGE 19





PROPORTIONAL DIRECTIONAL CONTOL VALVES

#### INSTALLATION DIMENSIONS: TYPE 4WRE (SIZE 10)



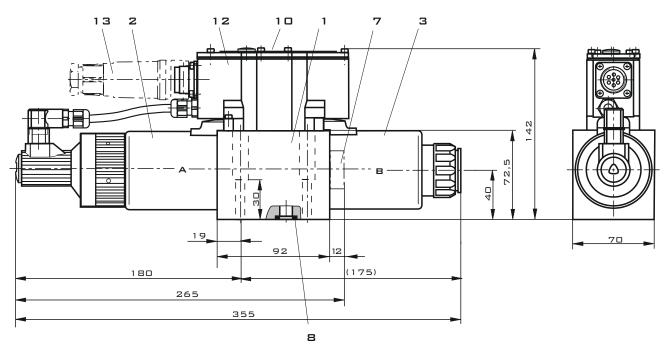
- 1 VALVE HOUSING
- 2 PROPORTIONAL SOLENOID "A" WITH INDUCTIVE POSITION TRANSDUCER
- 3 PROPORTIONAL SOLENOID "B"
- 4 MATING CONNECTOR "A", COLOR GRAY, SEPARATE ORDER SEE PAGE 18
- 5 MATING CONNECTOR "B", COLOR BLACK, SEPARATE ORDER - SEE PAGE 18
- 6 MATING CONNECTOR FOR INDUCTIVE POSITION TRANSDUCER, SEPARATE ORDER SEE PAGE 18
- 7 PLUG SCREW FOR VALVE WITH ONE SOLENOID
  (2 SPOOL POSITIONS, VERSION EA OR WA)
- 8 IDENTICAL SEAL RINGS FOR PORTS A, B, P, T AND T1
- 9 SPACE REQUIRED TO REMOVE THE MATING CONNECTOR
- 10 NAME PLATE
- 11 Machined valve contact surface, porting pattern according to ISO 4401-05-04-0-05 differing from the standard: Connection T1  $\not \square$  11.2 mm

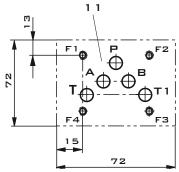




#### PROPORTIONAL DIRECTIONAL CONTOL VALVES

## INSTALLATION DIMENSIONS: TYPE 4WREE (SIZE 10)







REQUIRED SURFACE QUALITY OF THE VALVE MOUNTING FACE

GENERAL TOLERANCES ACCORDING TO ISO 2768-MK

- 1 VALVE HOUSING
- ${f 2}$  Proportional solenoid  ${}^{{}^{\parallel}}{}{}_{{}^{A}}{}^{{}^{\parallel}}$  with inductive position transducer
- 3 PROPORTIONAL SOLENOID B
- 7 PLUG SCREW FOR VALVE WITH ONE SOLENOID
  (2 SPOOL POSITIONS, VERSION EA OR WA)
- f 8 Identical seal rings for ports A, B, P, T and T1
- 10 NAME PLATE
- 11 Machined valve contact surface, porting pattern according to ISO 4401-05-04-0-05 differing from the standard: Connection T1  $\not\square$  11.2 mm
- 12 INTEGRATED ELECTRONICS (OBE)
- 13 MATING CONNECTOR, SEPARATE ORDER - SEE PAGE 19





PROPORTIONAL DIRECTIONAL CONTOL VALVES

## UNIT DIMENSIONS

HEXAGON SOCKET HEAD CAP SC	MATERIAL NUMBER	
SIZE 6	4x ISO 4762 - M5 x 50 - 10.9-FLZN-240H-L TIGHTENING TORQUE ${ m M_A}=7$ NM $\pm 10$ % OR 4x ISO 4762 - M5 x 50 - 10.9 TIGHTENING TORQUE ${ m M_A}=8.9$ NM $\pm 10$ %	R913000064
SIZE 10	4x ISO 4762 - M6 x 40 - 10.9-FLZN-240H-L TIGHTENING TORQUE $\rm M_A$ = 12.5 NM $\pm$ 10 % OR 4x ISO 4762 - M6 x 40 - 10.9 TIGHTENING TORQUE M = 15.5 NM $\pm$ 10 %	R913000058

P NOTICE:

THIS TIGHTENING TORQUE OF THE HEXAGON SOCKET HEAD CAP SCREWS REFERS TO THE MAXIMUM OPERATING PRESSURE!





#### PROPORTIONAL DIRECTIONAL CONTOL VALVES

#### **ELECTRICAL CONNECTION**

#### TYPE 4WRE (WITHOUT INTEGRATED ELECTRONICS)

# CONNECTION TO CONNECTOR

TO THE AMPLIFIER TO THE AMPLIFIER

MATING CONNECTOR CECC 75 301-803-A002FA-H3D08-G ACCORDING TO DIN EN 175301-803 AND ISO 4400

SOLENOID A, COLOR GRAY

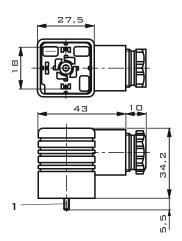
SEPARATE ORDER UNDER THE MATERIAL NO. R901017010

SOLENOID B, COLOR BLACK

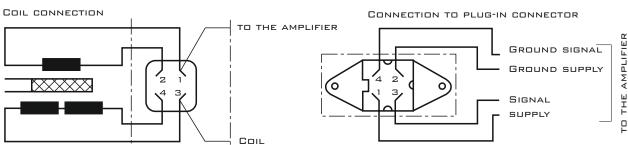
SEPARATE ORDER UNDER THE MATERIAL NO. R901017011

1 Mounting screw M3 Tightening torque  $\rm M_A = 0.5~Nm + 0.1~Nm$ 

PE



#### INDUCTIVE POSITION TRANSDUCER



MATING CONNECTOR 4-POLE PG7-G4W1F

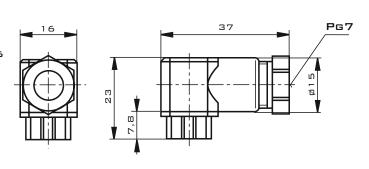
SEPARATE ORDER UNDER THE MATERIAL NO. R900023126

CONNECTION CABLE:

RECOMMENDATION:

UP TO 50 M CABLE LENGTH TYPE LIYCY 4 X 0.25  $^{2}\mathrm{MM}$ 

CONNECT SHIELD TO PE ONLY ON THE SUPPLY SIDE.







PROPORTIONAL DIRECTIONAL CONTOL VALVES

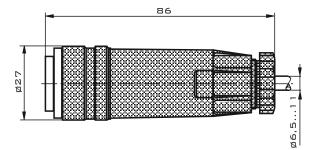
#### **ELECTRICAL CONNECTION**

TYPE 4WREE (WITH INTEGRATED ELECTRONICS (OBE)

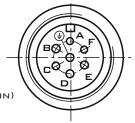
MATING CONNECTOR ACCORDING TO DIN EN 175201-804 SEPARATE ORDER UNDER THE MATERIAL NO. R900021267 (PLASTIC VERSION)

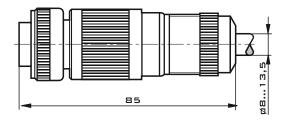
ANGULAR DESIGN - SEPARATE ORDER UNDER THE MATERIAL NO. R900217845

PIN ASSIGNMENT SEE ALSO BLOCK DIAGRAM PAGE 20



MATING CONNECTOR ACCORDING TO DIN EN 175201-804 SEPARATE ORDER UNDER THE MATERIAL NO. R900223890 (METAL VERSION)





DEVICE CONNECTOR ALLOCATION	CONTACT	SIGNAL WITH A1 INTERFACE	SIGNAL WITH F1 INTERFACE				
SUPPLY VOLTAGE	А	24 VDC (u(T) = 19.4 TO 35 V); I MAX = 2 A					
	В	o V					
REFERENCE POTENTIAL ACTUAL VALUE	С	Reference contact F; $\mathbf{R}_{e}$ >50k $\Omega$	Reference contact F; $\mathbf{R}_{\epsilon}$ < 10 $\Omega$				
DIFFERENTIAL AMPLIFIER INPUT	D	$\pm$ 10 V command value; ${f R}_{ m e}$ >50k $\Omega$ 4 to 20 mA command value; ${f R}_{ m e}$ >1					
	E						
MEASURING DUTPUT (ACTUAL VALUE)	F	±10 V ACTUAL VALUE 4 TO 20 MA ACTUAL VA					
	PE	Connected to cooling element and valve housing					

COMMAND VALUE: POSITIVE COMMAND VALUE  $\square$  TO + 1  $\square$  V ( $\square$ R 12 TO 2 $\square$  MA) AT D AND REFERENCE POTENTIAL AT E RESULT IN FLOW FROM P  $\rightarrow$  A AND B  $\rightarrow$  T.

> NEGATIVE COMMAND VALUE O TO -10 V (OR 12 TO 4 MA) AT D AND REFERENCE POTENTIAL AT E RESULT IN FLOW FROM P  $\rightarrow$  B AND A  $\rightarrow$  T.

FOR VALVES WITH 1 SOLENOID ON SIDE A (E. G. VARIANT **EA** AND **WA**). A POSITIVE COMMAND VALUE  $\Box$  TO  $\pm$ 10 V (or 4 to 20 mA) at D and reference potential at E result in flow from P  $\rightarrow$  B and A  $\rightarrow$  T.

ACTUAL VALUE  $\mathtt{O}$  TO  $\pm \mathtt{10V}$  (or  $\mathtt{12}$  TO  $\mathtt{20}$  MA) AT  $\mathtt{F}$  AND REFERENCE POTENTIAL AT  $\mathtt{C}$  RESULT IN FLOW FROM P ightarrow A and B ightarrow T, actual value O to -1 OV (or 4 to 12 mA) result in flow from P ightarrow B and A ightarrow T.

WITH VALVES WITH 1 SOLENDID, A POSITIVE ACTUAL VALUE  $\square$  To  $\pm$ 10 V (or 4 to 20 mA) at F and reference potential AT C RESULT IN FLOW FROM P  $\rightarrow$  B AND A  $\rightarrow$  T.

Connection cable: Recommendation: – up to 25 m cable length type LiYCY  $7 \times 0.75 \text{ mm}^2$ 

– UP TO 50 M CABLE LENGTH TYPE LIYCY  $7 \times 1.0 \, \text{MM}^2$ 

EXTERNAL DIAMETER SEE SKETCH OF MATING CONNECTOR

CONNECT SHIELD TO PE ONLY ON THE SUPPLY SIDE.





#### PROPORTIONAL DIRECTIONAL CONTOL VALVES

			RDER	CODI	Ε					
	4WRE		- 2	x/G	24	/	V	*		
WITHOUT INTEGRATED									Furt	HER DETAILS IN
ELECTRONICS (OBE)	= NO CODE									THE PLAIN TEXT
WITH INTEGRATED	_								5	SEAL MATERIAL
ELECTRONICS (OBE)	= E							/ =		FKM SEALS <sup>1)</sup>
SIZE 6		= 6								INIC INTERFACE
SIZE 10		10					A1 =			VALUE ±10 V
CONTROL SPOOL SYMBOL							F1 =		MAND VALI	JE 4 TO 20 MA
	A B						NO CC			TYPE 4WRE
	A 0 B							ı	ELECTRICA	L CONNECTION
	PT					K4 =	_	14/		TYPE 4WRE:
	г .						-			OR ACCORDING
		_								75301-803
X	X	= E E1-				М	ATING (	CONNEC	TOR (SOLE	NOID, POSITION
<del>2311 1 4 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 </del>						TRANS	SDUCER	), SEPAF		R, SEE PAGE 18
										TYPE 4WREE:
						K31	=			NG CONNECTOR,
		= V								75201-804
	<del></del> ,	V1-					MATING			PARATE ORDER,
										SEE PAGE 19
	TADOUR I	_ ,,,,							Sı	JPPLY VOLTAGE
		= W W1-			G24				DIRECT	VOLTAGE 24 V
<del></del>	<del></del>	** .		zx =						20 то 29
	А В					(20	то 29	: UNCH	ANGED INS	TALLATION AND
	<del></del> -								CONNECTIO	N DIMENSIONS)
	^   -			RATED	FLOW	AT VALV	E PRES	SURE DI	FFERENTIA	L $\Delta oldsymbol{p}=$ 10 bar
	PT									SIZE 6
			04							4 L/MIN
<del>────────────────────────────────────</del>			08							8 L/MIN
<u>                                     </u>	ليتلكا	= EA	16							16 L/MIN
1 1	1 1		32	_						32 L/MIN <b>Size 10</b>
<del></del>	<del></del>		25	=						25 L/MIN
X \ <u>`</u> T			50							50 L/MIN
		= WA	75							75 L/MIN
			1,,							

P→B:q  $_{\lor}/2$ 

In the zero position, spools W and WA have a connection from A to T and B to T with approx. 3 % of the relevant nominal cross-section.

 $A {
ightarrow} T: oldsymbol{q} igwedge_{V \; MAX}$ 

WITH SYMBOL E1-, V1- AND W1-: P-A: $\pmb{q}_{\text{VMAX}}$  B-T: $\pmb{q}_{\text{V}}/2$ 

PNOTICE:

 $<sup>^{1)}\</sup>mbox{Design}$  SD660 with NBR seals at the valve connection surface

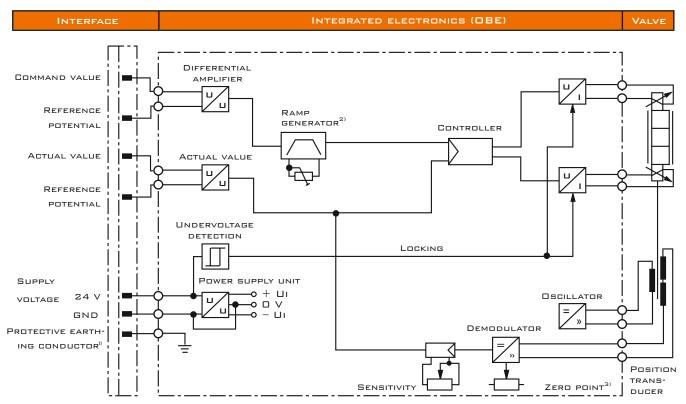




PROPORTIONAL DIRECTIONAL CONTOL VALVES

#### INTEGRATED ELECTRONICS (OBE) FOR TYPE 4WREE

#### **BLOCK DIAGRAM / PIN ASSIGNMENT**



#### P NOTICE:

ELECTRIC SIGNALS TAKEN OUT VIA CONTROL ELECTRONICS (E.G. ACTUAL VALUE) MUST NOT BE USED FOR SWITCHING OFF SAFETY-RELEVANT MACHINE FUNCTIONS.

