Hydraulic Fixed Piston Rexroth A2FE Motor

Series 6, axial tapered piston, bent axis design for mounting in mechanical gearboxes

Pressure up to 400 bar Peak Pressure up to 450 bar

The fixed displacement plug-in motor A2FE is equipped with a standard axial tapered piston rotary group of bent axis design.

Hydrostatic plug-in motors are intended primarily for installation in mechanical gearboxes, e.g. track drive gear boxes.

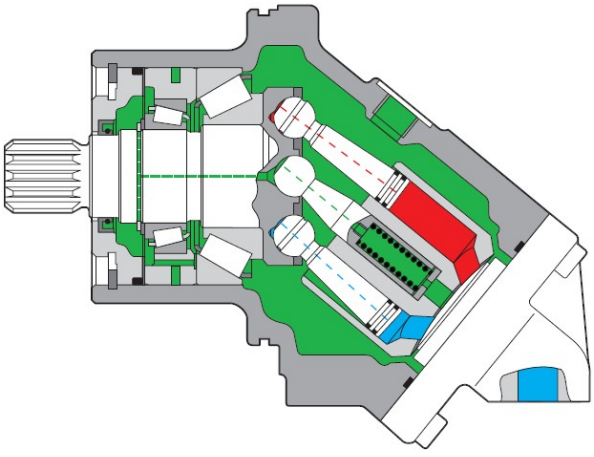
The design of the motor with the mounting flange in the centre of the housing allows it to be almost fully integrated into a mechanical gearbox to give an extremely compact unit.

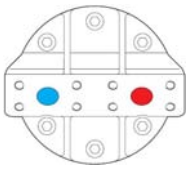
– complete unit, ready assembled and tested

– easy assembly, simply «plugs-in» to mechanical gearboxes

– no installation tolerances to consider

– Interchangeable with original Rexroth motor of the same model.





Ordering Code / Standard Program

	A2F		E		/	6		W	-				

Hydraulic Fluid

Mineral oil (no code)		
HF-fluids	sizes 28...180 (no code)	
	size 250...355 [1])	E-

Axial piston unit

Bent axis design, fixed displacement	A2F

Drive shaft bearings

	28...180	250...355	
mechanical bearings (no code)	●	●	
Long-Life bearings	–	●	L

Mode of operation

Plug-in motor	E

Size

≙ Displacement V_g (cm³)	28	32	45	56	63	80	90	107	125	160	180		

Series

	6

Index

sizes 28...180	1

Direction of rotation

viewed on shaft end	alternating	W

Seals

NBR (nitril-caoutchouc), shaft seal in FPM	●		N
FPM (fluor-caoutchouc)	●	●	V

Shaft end

	28	32	45	56	63	80	90	107	125	160	180			
Splined shaft end	●	●	●	●	●	●	●	●	●	●	●	–	–	A
	●	–	●	●	●	●	●	●	●	●	●	●	●	Z

Mounting flange

Special 2-hole flange	●	–	L
Special 4-hole flange	–	●	M

Service line connections

			28	32	45	56	63	80	90	107	125	160	180			
Ports A and B SAE, rear end	01	0	●	●	●	●	●	●	●	●	●	●	●	●	–	010
Ports A and B SAE at side, same side (metr. mounting threads)	10	0	●	●	●	●	●	●	●	●	●	●	●	–	●	100
		6	●	●	●	●	●	●	●	–	–	–	–	–	–	106
portplate with integrated pressure relief valves, for mounting a motion control valve	17	1			–	–	–	–	–	●	●	–	–	–	–	171
portplate with integrated pressure relief valves, for mounting a motion control valve	18	1	●	●	●	●	●	●	●	●	●	●	●	-	-	181
portplate with integrated pressure relief valves	19	1	●	●	●	●	●	●	●	●	●	●	●	-	-	191
		2	●	●	●	●	●	●	●	●	●	●	●	-	-	192

Valves

without valves (no code)	0
with pressure relief valves (without pressure sequence range)	1
with pressure relief valves (with pressure sequence range)	2
with integrated flushing valve	6

● = available
= not available

= preferred program

[1]) only in connection with drive shaft bearings "**L**"

Technical Data

Fluid
We request that before starting a project detailed information about the choice of pressure fluids and application conditions are taken from out catalogue sheets RE 90220 (mineral oil), RE 90221 (environmentally acceptable hydraulic fluids) and RE 90223 (fire resistance fluids, HF).
When using HF- or environmentally acceptable hydraulic fluids possible limitations for the technical data have to be taken into consideration. If necessary please consult our technical department (please indicate type of the hydraulic fluid used for your application on the order sheet).

Operating viscosity range
In order to optain optimum efficiency and service life, we recommend that the operating viscosity (at operating temperature) be selected from within the range:

$_{opt}$ = operating viscosity 16...36 mm²/s

referred to the loop temperature (closed circuit) or tank temperature (open circuit).

Viscosity limits
The limiting values for viscosity are as follows:

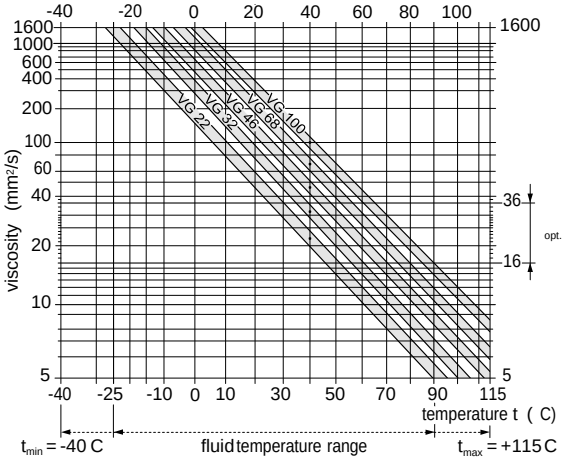
sizes 28...180
$_{min}$ = 5 mm²/s,
short term at a max. permissible temperature of t_{max} = 115 C
$_{max}$ = 1600 mm²/s, short term on cold start (t_{min} = -40 C)

sizes 250...355
$_{min}$ = 10 mm²/s
short term at a max. permissible leakage oil temp. of t_{max} = 90 C
$_{max}$ = 1000 mm²/s,
short term on cold start (t_{min} = -25 C)

Please note that the max. fluid temperature is also not exceeded in certain areas (for instance bearing area).

At temperatures of -25 C up to -40 C special measures may be required for certain installation positions. Please contact us for further information.

Selection diagram



Notes on the selection of the hydraulic fluid
In order to select the correct fluid, it is necessary to know the operating temperature in the loop (closed circuit) or the tank temperature (open circuit) in relation to the ambient temperature. The hydraulic fluid should be selected so that within the operating temperature range, the operating viscosity lies within the optimum range ($_{opt}$) (see shaded section of the selection diagram). We recommend that the highest possible viscosity range should be chosen in each case.
Example: At an ambient temperature of X C the operating temperature (closed circuit: loop temperature; open circuit: tank temperature) is 60 C. Within the operating viscosity range ($_{opt}$; shaded area), this corresponds to viscosity ranges VG 46 or VG 68. VG 68 should be selected.
Important: The leakage oil (case drain oil) temperature is influenced by pressure and motor speed and is always higher than the circuit or tank temperature. However, at no point in the circuit may the temperature exceed 115 C for sizes 28…180 or 90 C for size 250...355.
If it is not possible to comply with the above conditions because of extreme operating parameters or high ambient temperatures please consult us.

Filtration
The finer the filtration the better the achieved purity grade of the pressure fluid and the longer the life of the axial piston unit.
To ensure the functioning of the axial piston unit a minimum purity grade of:

9 to NAS 1638
6 to SAE
18/15 to ISO/DIS 4406 is necessary.

At very high temperatures of the hydraulic fluid (90 C to max. 115 C, not permissible for sizes 250...355!) at least cleanless class 8 to NAS 1638
5 to SAE
17/14 to ISO/DIS 4406 is necessary.

If above mentioned grades cannot be maintained please consult supplier.

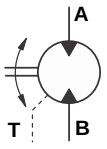
Direction of Flow

Clockwise rotation	Anti-clockwise rotation
A to **B**	**B** to **A**

Speed range
There is no limitation on minimum speed n_{min}. If uniformity of rotation is required, however, speed n_{min} should not be allowed to fall below 50 rpm.
See table on page 5 for max. permissible speeds.

Installation position
Any installation position possible. In case of vertical installation (drive shaft up) please contact us. The motor housing must be filled with fluid prior the commissioning, and must remain full whenever it is operating.
For extensive information on installation postition, please consult our data sheet RE 90270 before completing your design work.

Symbol



Connections
A, B service line ports
T case drain port

Technical Data

Operating pressure range
Maximum pressure at port A or B
(Pressure data to DIN 24312)

Sizes 28...180	Shaft end A	Shaft end Z *)	
	sizes 28...180	sizes 28,45,56 80,107,160	sizes 63,90 125,180
Nominal pressure p_N	400 bar	400 bar	350 bar
Peak pressure p_{max}	450 bar	450 bar	400 bar

*) Attention: shaft end Z with drives of radial force loads at the drive shaft (pinion V-belt drives) necessitate reduction of the nominal pressure (please contact us).

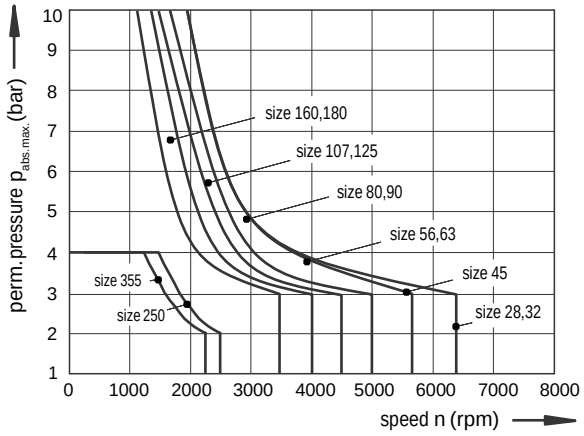
Sizes 250...355	
Nominal pressure p_N	350 bar
Peak pressure p_{max}	400 bar

With pulsating loads above 315 bar we recommend using the model with splined shaft, standart version A (sizes 28…180).

The summ of the pressures at ports A and B may not exceed 700 bar.

Case drain pressure
The lower the speed and the case drain pressure the higher the life expectation of the shaft seal ring.

Shaft seal ring **FPM** (fluor-caoutchouc)
The values shown in the diagram are permissible loads of the seal ring and shall not be exceeded.
At stationary pressure loads in the range of the max. admissible leakage pressure a reduction of the life experience of the seal ring will result.
For a short period (t < 5 min.) for the sizes 28…180 pressure loads up to 5 bar independent from rotational speeds are permissible.



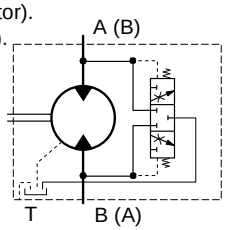
Special operation conditions may require limitations of these values.

Note:
- maximum permissible motor speeds are given in the table on page 5
- max. perm. casing pressure $p_{abs.\ max}$ – 10 bar (sizes 28...180)
  ____4 bar (sizes 250...355)
- the pressure in the housing must be the same as or greater than the external pressure on the shaft seal.

Integral flushing valve
In order to prevent excessive heat build-up in closed circuit operation, it is possible to fit a flushing valve (built into the port plate).
- switching pressure p 8 bar (this value is lower than the starting pressure of an unloaded motor).
- closed in centre position (p < 8 bar).

Sizes	23-32	45-63	80-90
Flushing-volume l/min	2,5	3,1	4,1

(values given for low pressure p = 25 bar)



Long-Life bearings (L) (sizes 250... 355)
(for high life expectancy and use of HF-fluids)

The outer dimensions of the axial piston motors are identical to standard design (without long life bearings). The change from standard design to long life bearing system is possible.

Table of values (theoretical values, without considering η_{mh} and η_v; values rounded)

Size			**28**	**32**	**45**	**56**	**63**	**80**	**90**	**107**	**125**	**160**	**180**	**250**	**355**
Displacement	V_g	cm^3	28,1	32,0	45,6	56,1	63,0	80,4	90,0	106,7	125,0	160,4	180,0	250	355
Max. speed	n_{max}	rpm	6300	6300	5600	5000	5000	4500	4500	4000	4000	3600	3600	2500	2240
	$n_{max\ interm.}$ [1])	rpm	6900	6900	6200	5500	5500	5000	5000	4400	4400	4000	4000	–	–
Max. flow	$q_{V\,max}$	L/min	176	201	255	280	315	360	405	427	500	577	648	625	795
Torque constants	T_K	Nm/bar	0,445	0,509	0,725	0,89	1,0	1,27	1,43	1,70	1,99	2,54	2,86	3,98	5,64
Torque, p = 400 bar	T	Nm	178	204	290	356	400	508	572	680	796	1016	1144	1393 [2])	1976 [2])
Casevolume		L	0,20	0,20	0,33	0,45	0,45	0,55	0,55	0,8	0,8	1,1	1,1	2,5	3,5
Moment of inertia	J	kgm^2	0,0012	0,0012	0,0024	0,0042	0,0042	0,0072	0,0072	0,0116	0,0116	0,0220	0,0220	0,061	0,102
Weight (approx.)	m	kg	10,5	10,5	15	18	19	23	25	34	36	47	48	82	110

[1]) Intermittent max. speed: overspeed at discharge and overtaking travel operations, t < 5 sec. and p < 150 bar
[2]) p = 350 bar

Calculation of size

Flow $q_V = \dfrac{V_g \cdot n}{1000 \cdot \eta_v}$ in L/min

Output speed $n = \dfrac{q_V \cdot 1000 \cdot \eta_v}{V_g}$ in rpm

Output torque $T = \dfrac{V_g \cdot p \cdot \eta_{mh}}{20 \cdot \pi}$

$= \dfrac{1{,}59 \cdot V_g \cdot p \cdot \eta_{mh}}{100}$ in Nm

or $T = T_K \cdot p \cdot \eta_{mh}$ in Nm

Output power $P = \dfrac{2 \cdot \pi \cdot T \cdot n}{60\,000} = \dfrac{T \cdot n}{9549}$

$= \dfrac{q_V \cdot p}{600} \cdot \eta_t$ in kW

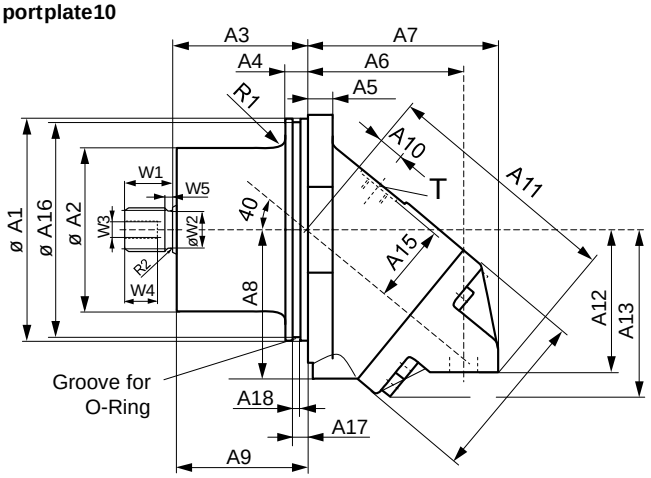
V_g = geometric displacement per rev. in cm^3
T = torque in Nm
p = pressure differential in bar
n = speed in rpm
T_K = torque constants in Nm/bar
η_v = volumetric efficiency
η_{mh} = mech.-hyd. efficiency
η_t = overall efficiency

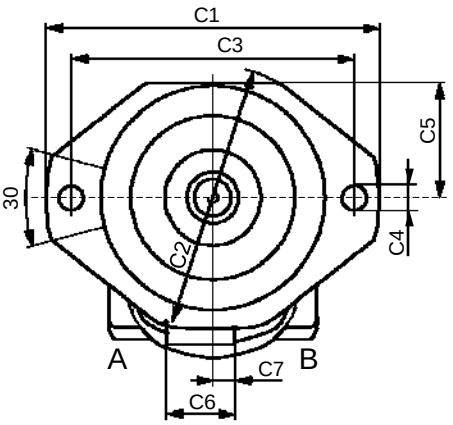
Preferred types, please state type and indent-no. when ordering

Type	**Ident-No.**	**Type**	**Ident-No.**
A2FE28/61W-NAL100	9419990	A2FE90/61W-NAL100	9416951
A2FE32/61W-NAL100	9418424	A2FE107/61W-NAL100	9419560
A2FE45/61W-NZL100	9437748	A2FE125/61W-NAL100	9418426
A2FE56/61W-NAL100	9437482	A2FE160/61W-NAL100	9421900
A2FE63/61W-NAL100	9437443	A2FE180/61W-NAL100	9421394
A2FE80/61W-NAL100	9419867		

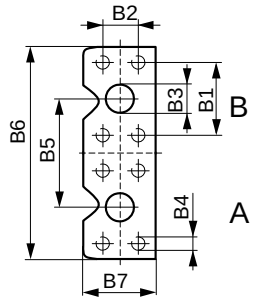
Unit Dimension, Sizes 28...180

portplate10





Detail X



Connections

A, B	service line ports SAE 420 bar (6000 psi) high pressure series
T	drain port

Size	C1	ØC2	C3	C4	C5	C6	C7
28, 32	188	154	160	14	71	42	12,5
45	235	190	200	18	82	47,5	15
56, 63	235	190	200	18	82	36	0
80, 90	260	220	224	22	98	40	0
107, 125	286	232	250	22	103	40	0
160, 180	286	232	250	22	104	42	0

Size	ØA1	ØA2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	ØA14	A15	A16	A17	A18
28,32	135_{h6}	94 1,5	88,8	15	16	94	114	95	87,1	19	149	91	106	106	51,5	128,7	10	5,2
45	160_{h6}	$117_{-2}^{+1,5}$	92,3	15	18	109	133	106	90	18	167	102	119	118	56	153,7	10	5,2
56,63	160_{h6}	121 0,5	92,3	15	18	122	146	109	90	18	176	107	130	128	59	153,7	10	5,2
80,90	190_{h6}	139 1,3	110,8	15	20	127	157	123	106	15	198	121	145	138	66	183,7	10	5,2
107,125	200_{h6}	151 1,3	122,8	15	20	143	178	135	119	18	224	136	157	150	69	193,7	10	5,2
160,180	200_{h6}	170 1,6	122,8	15	20	169	211	134	119,3	19,5	244	149	188	180	78	193,7	10	5,2

Size	R1	O-Ring[1])	B1	B2	ØB3	B4	Threads	B5	B6	B7	Port A, B	Drainports T
28,32	10	126x4	40,5	18,2	13	M8; 15 deep		59	115	40	SAE 1/2"	M16x1,5; 12 deep
45	10	150x4	50,8	23,8	19	M10; 17 deep		75	147	49	SAE 3/4"	M18x1,5; 12 deep
56,63	10	150x4	50,8	23,8	19	M10; 17 deep		75	147	49	SAE 3/4"	M18x1,5; 12 deep
80,90	10	180x4	57,2	27,8	25	M12; 17 deep		84	166	60	SAE 1"	M18x1,5; 12 deep
107,125	16	192x4	66,7	31,8	32	M14; 19 deep		99	194	70	SAE 1 1/4"	M22x1,5; 12 deep
160,180	12	192x4	66,7	31,8	32	M14; 19 deep		99	194	70	SAE 1 1/4"	M22x1,5; 12deep

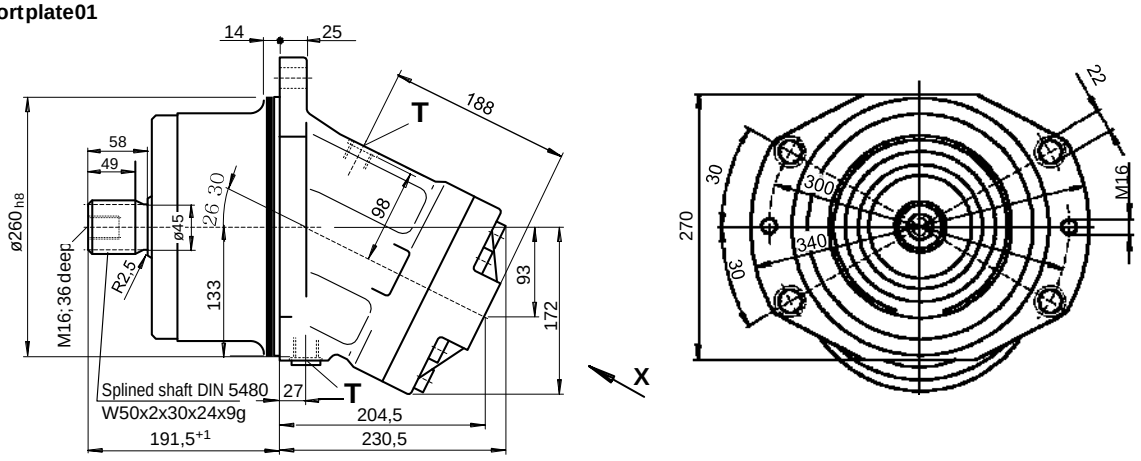
[1]) The O-ring is not comprised in the delivery volume!

Size		Shaftend (DIN5480)	W1	ØW2	W3	W4	W5	R2
28,32	**A**	W 30x2x30x14x9g	35,2	24,6	M10	22	8	1,6
28	**Z**	W 25x1,25x30x18x9g	43,2	21,6	M8	19	15	1,6
45	**A**	W 32x2x30x14x9g	35	26,6	M12	28	8	1,6
	Z	W 30x2x30x14x9g	35	24,6	M12	28	8	1,6
56,63	**A**	W 35x2x30x16x9g	40	29,6	M12	28	8	1,6
	Z	W 30x2x30x14x9g	35	24,6	M12	28	8	1,6

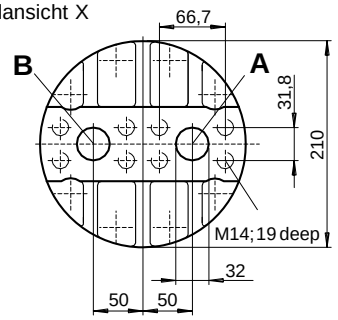
Size		Shaftend (DIN5480)	W1	ØW2	W3	W4	W5	R2
80,90	**A**	W 40x2x30x18x9g	45	34,6	M16	36	8	2,5
	Z	W 35x2x30x16x9g	40	29,6	M12	28	8	1,6
107,125	**A**	W 45x2x30x21x9g	50	39,6	M16	36	8	2,5
	Z	W 40x2x30x18x9g	45	34,6	M12	28	8	2,5
160,180	**A**	W 50x2x30x24x9g	55	44,6	M16	36	11	4
	Z	W 45x2x30x21x9g	50	39,6	M16	36	8	2,5

Unit Dimensions, Size 250

portplate01



Teilansicht X

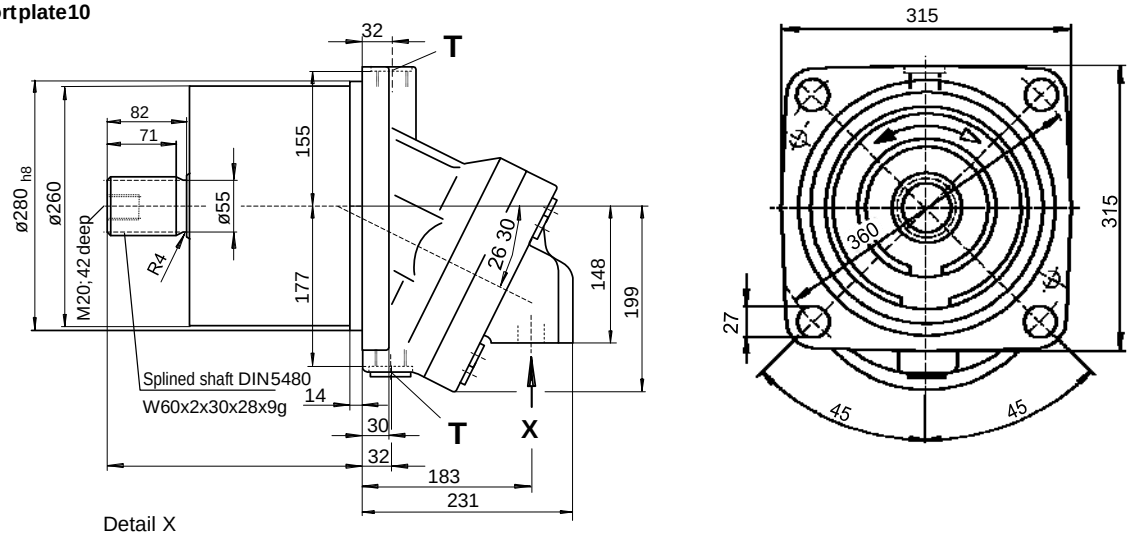


Connections

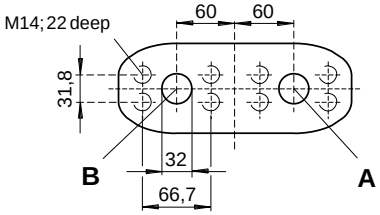
A, B	service line ports 420 bar (6000 psi) high pressure series	SAE 1 1/4"
T	drain ports (1 port plugged)	M22x1,5

Unit Dimensions, Size 355

portplate10



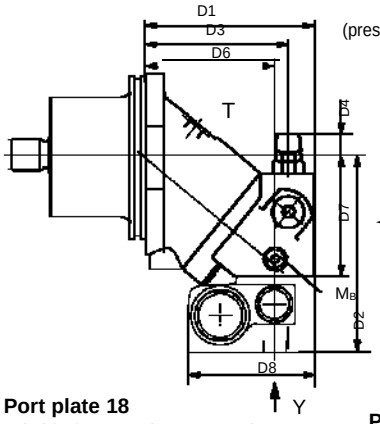
Detail X



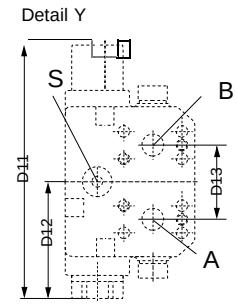
Connections

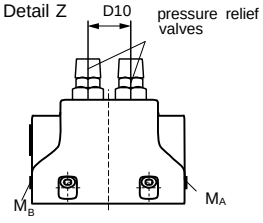
A, B	service line ports 420 bar (6000 psi) high pressure series	SAE 1 1/4"
T_1,T_2	drain ports (1 port plugged)	M33x2

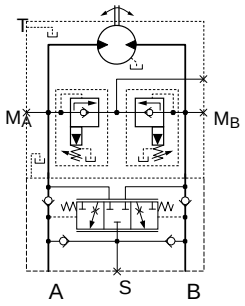
Port plate 17, 18 with integrated pressure relief valves, for mounting a motion control valve



Port plate 17**1**, 18**1**
(pressure relief valves without pressure sequence range)







Port plate 18
suitable for mounting a Rexroth motion control valve (see RE 64317):
MHB**16**....18 (A2FM 28, 32, 45)
MHB**16**....18E (A2FM 56, 63)
MHB**20**....11 (A2FM 56, 63)
MHB**20**....18 (A2FM 80, 90)
MHB**25**....18 (A2FM107, 125, 160, 180)

Port plate 17
suitable for mounting a Rexroth motion control valve (see RE 64317):
MHB**20**....18E (A2FM 107, 125)

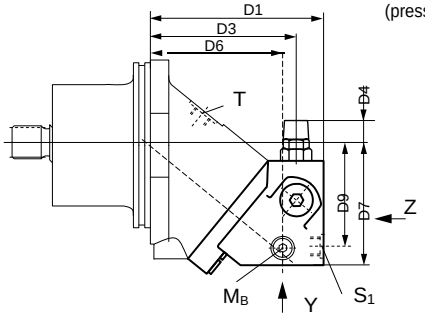
Connections

A, B	service line ports SAE, 420 bar (see table below) (6000psi high pressure series)	
S	boosting	(see table below)
M_A, M_B	test ports (plugged)	M12x1,5

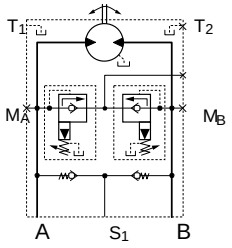
The motion control valve is not included in the ordering code and has to be indicated separately.

We recommend total supply through Brueninghaus Hydromatik.

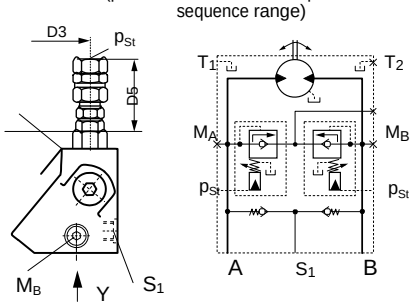
Port plate 19, with integrated pressure relief valves

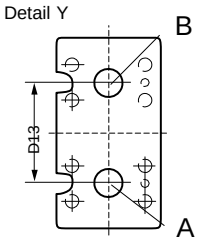


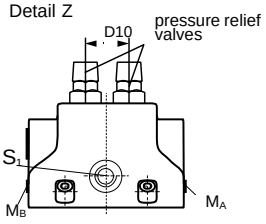
Port plate 19**1**
(pressure relief valves without pressure sequence range)



Port plate 19**2**
(pressure relief valves with pressure sequence range)







Connections

A, B	service line ports SAE, 420 bar (see table below) (6000 psi high pressure series)	
S_1	boosting	(see table below)
p_{St}	pilot pressure port	G 1/4
M_A, M_B	test ports (plugged)	M20x1,5 (Sizes 28...45) M26x1,5 (Sizes 56...125) M30x1,5 (Sizes 160...180)

Pressure relief valves

-without pressure sequence range(1)	-with pressure sequence range(2)
MHDBN**16** (Sizes 28...45)	MHDBB**16** (Sizes 28...45)
MHDBN**22** (Sizes 56...90)	MHDBB**22** (Sizes 56...90
MHDBN**32** (Sizes 107...180)	MHDBB**32** (Sizes 107...180)

Size		D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	Ports A, B	Port S	Port S_1
28, 32		145	170	127	25	63	110	102	115	87	36	215,5	93,5	66	SAE 3/4"	M 18x1,5	M 22x1,5
45		161	181	136	22	60	126	113	115	98	36	215,5	93,5	66	SAE 3/4"	M 18x1,5	M 22x1,5
56, 63	(+MHB16)	189	192	162	19	57	147	124	115	105	42	215,5	93,5	75	SAE 3/4"	M 18x1,5	M 26x1,5
	(+MHB20)	189	192	162	29	57	147	124	137	105	42	235	96	75	SAE 3/4"	M 22x1,5	M 26x1,5
80, 90		193	202	165	17,5	55	151	134	137	114	42	235	96	75	SAE 1"	M 22x1,5	M 26x1,5
107, 125	(+MHB20)	216	217,5	184	10	48	168	149,5	137	130	53	286	120,5	84	SAE 1"	M 27x2	M 26x1,5
	(+MHB25)	216	234,5	184	10	48	168	149,5	151,5	130	53	286	120,5	84	SAE 1 1/4"	M 27x2	M 26x1,5
160, 180		253	255	222	5	—	204	170	151,5	149	53	286	120,5	84	SAE 1 1/4"	M 27x2	M 26x1,5

Details model of Rexroth A2FE motor

A2FE355/60W-VZM010	R902065907 A2FE90/61W-VZL191J-K	R902084416 A2FE125/61W-VAL171-K
A2FE355/60W-VZM017	R902065989 A2FE56/61W-VZL027-S	R902084428 A2FE125/61W-VAL027-S
A2FE355/60W-VZM020	R902067562 A2FE80/61W-VAL181-K	R902086572 A2FE56/61W-VAL100D-S *G*
A2FE355/60W-VZM0100	R902067618 A2FE56/61W-VZL192J-SK	R902065853 A2FE80/61W-VAL181-K
A2FE250/60W-VZM010	R902065790 A2FE45/61W-VZL181-K	R902065856 A2FE107/61W-VZL171-SK
A2FE250/60W-VZM017	R902067665 A2FE90/61W-VAL181-K	R902065772 A2FE90/61W-VZL192J-K
A2FE250/60W-VZM020	R902065642 A2FE63/61W-VAL100-S	R902033035 A2FE63/61W-VAL181-K
A2FE250/60W-VZM0100	R902065733 A2FE180/61W-VAL181-K	R902065770 A2FE90/61W-VZL190J
R909437443 A2FE63/61W-VAL100	R902137874 A2FE125/61W-VZL100 S	R902155643 A2FE90/61W-VAL106
R909437482 A2FE56/61W-VAL100	R902137875 A2FE125/61W-VZL100 S	R902155644 A2FE90/61W-VAL100
R909437748 A2FE45/61W-VZL100	R902137876 A2FE125/61W-VZL100 S	R902155652 A2FE160/61W-VZL100
R909416951 A2FE90/61W-VAL100	R902137877 A2FE125/61W-VZL100 S	R902155725 A2FE180/61W-VZL100 S
R909418424 A2FE32/61W-VAL100	R902137880 A2FE125/61W-VZL100 S	R902155745 A2FE125/61W-VZL192J S
R909418426 A2FE125/61W-VAL100	R902137898 A2FE90/61W-VZL100 S	R902155746 A2FE90/61W-VAL181
R909419560 A2FE107/61W-VAL100	R902137936 A2FE107/61W-VZL181	R902155754 A2FE56/61W-VZL027 S
R909419867 A2FE80/61W-VAL100	R902138009 A2FE125/61W-VZL100 S	R902155771 A2FE125/61W-VZL100F S
R909419990 A2FE28/61W-VAL100	R902138047 A2FE90/61W-VAL106	R902155776 A2FE107/61W-VZL027F S
R909421394 A2FE180/61W-VAL100	R902138108 A2FE90/61W-VAL020 S	R902155781 A2FE125/61W-VZL192J S
R902065772 A2FE90/61W-VZL192J S	R902138118 A2FE80/61W-VAL020 S	R902155786 A2FE160/61W-VZL027 S
R902078992 A2FE107 61L VXLXX0 S	R902138132 A2FE80/61W-VAL020F S	R902155788 A2FE80/61W-VAL181
R902137505 A2FE125/61W-VAL100 S	R902138471 A2FE80/61W-VAL100	R902155789 A2FE90/61W-VAL181
R902137513 A2FE90/61W-VZL106 S	R902138483 A2FE56/61W-VZL100F S	R902155797 A2FE45/61W-VZL100
R902137519 A2FE90/61W-VAL027 S	R902138495 A2FE90/61W-VZL100F S	R902155829 A2FE160/61W-VZL181
R902137520 A2FE80/61W-VAL106	R902139830 A2FE45/61W-VZL181	R902155830 A2FE63/61W-VZL027 S
R902137545 A2FE180/61W-VZL100 S	R902139973 A2FE56/61W-VZL181	R902155831 A2FE107/61W-VZL027F S
R902137582 A2FE107/61W-VZL027 S	R902149472 A2FE80/61W-VAL100	R902155879 A2FE160/61W-VZL181
R902137596 A2FE125/61W-VAL027 S	R902153515 A2FE28/61W-VAL100	R902155925 A2FE180/61W-VAL181
R902137627 A2FE125/61W-VAL100	R902153605 A2FE160/61W-VZL100F	R902156026 A2FE90/61W-VZL027 S
R902137649 A2FE90/61W-VAL100	R902155017 A2FE180/61W-VZL181 S	R902156126 A2FE45/61W-VZL106
R902137664 A2FE125/61W-VAL100	R902155522 A2FE160/61W-VZL181	R902156283 A2FE107/61W-VZL100
R902137803 A2FE107/61W-VZL010	R902155555 A2FE125/61W-VAL106F	R902156332 A2FE63/61W-VZL106 S
R902137828 A2FE90/61W-VAL100	R902155583 A2FE80/61W-VAL192J	R902156342 A2FE180/61W-VAL027 S
R902137829 A2FE90/61W-VAL100	R902155593 A2FE80/61W-VAL100F	R902158626 A2FE180/61W-VAL100
R902137831 A2FE90/61W-VAL100	R902155621 A2FE125/61W-VZL181F S	R902158629 A2FE32/61W-VAL100
R902137836 A2FE90/61W-VAL100	R902155629 A2FE80/61W-VAL027 S	R902160009 A2FE45/61W-VZL100
R902137837 A2FE90/61W-VAL100	R902137854 A2FE80/61W-VAL100	R902160034 A2FE32/61W-VAL100
R902137842 A2FE125/61W-VAL100	R902137856 A2FE80/61W-VAL100	R902160513 A2FE63/61W-VZL106 S
R902137844 A2FE125/61W-VZL100 S	R902137863 A2FE107/61W-VZL100	R902160555 A2FE125/61W-VZL100 S
R902137846 A2FE125/61W-VAL100	R902137865 A2FE107/61W-VZL100	R902160649 A2FE125/61W-VZL100 S
R902137850 A2FE107/61W-VAL100	R902137866 A2FE107/61W-VZL100	R902160744 A2FE56/61W-VZL100 S
R902137851 A2FE80/61W-VAL100	R902137870 A2FE107/61W-VZL100	R902160757 A2FE63/61W-VZL100 S
R902137852 A2FE80/61W-VAL100	R902137872 A2FE107/61W-VZL100	R902160765 A2FE63/61W-VZL100 S
R902137853 A2FE80/61W-VAL100	R902160959 A2FE63/61W-VAL100 S	R902160774 A2FE56/61W-VZL100
R902160943 A2FE80/61W-VAL181	R902160971 A2FE63/61W-NZL201 S	R902160800 A2FE56/61W-VZL100
R902160956 A2FE107/61W-VZL100	R902160982 A2FE56/61W-VZL181	R902160897 A2FE90/61W-VAL020F S
R902404657 AA2FE250/60W-VZM010D	R902036623 A2FE45/61W-VZL100D-SK	R902160938 A2FE80/61W-VZL100
R902418396 AL A2FE250/60W-VZM010	R902036652 A2FE180/61W-VZL181-K	R902067679 A2FE45/61W-VZL181-K
R910967545 A A2FE250/60W-VZM010	R902036666 A2FE80/61W-VZL181-K	R902067738 A2FE107/61W-XAL100J-S
R910983204 A A2FE250/60W-VZM027	R902036678 A2FE56/61W-VZL020D-S u*G*	R902067754 A2FE90/61W-VZL181-K
R902009546 A2FE56/61W-VZL192J-K	R902036680 A2FE56/61W-VZL020D-SK *Z*	R902067836 A2FE45/61W-VZL181-K
R902009866 A2FE80/61W-NZL181-K *G*	R902036701 A2FE63/61W-VAL100-S	R902067848 A2FE80/61W-VAL181-K
R902009974 A2FE90/61W-NAL300 *G*	R902038566 A2FE45/61W-VZL181-K *G*	R902067880 A2FE63/61W-VZL027D
R902011591 A2FE107/61W-NZL181-K *G*	R902038575 A2FE32/61W-VAL181-K *G*	R902067882 A2FE63/61W-VZL027D-K
R902011592 A2FE107/61W-NZL181-K *G*	R902038581 A2FE45/61W-VAL181-K *G*	R902067916 A2FE45/61W-VZL106-S
R902011751 A2FE125/61W-NZL181-K *G*	R902038592 A2FE107/61W-VZL181-K *G*	R902068528 A2FE160/61W-VZL010
R902011752 A2FE180/61W-NZL181-K *G*	R902038619 A2FE45/61W-VZL020D-S	R902068664 A2FE80/61L-VXLXX0-S *G*
R902011791 A2FE160/61W-VZL027-S *G*	R902038621 A2FE45/61W-VZL020D-SK	R902068677 A2FE45/61L-VXLXX0-S
R902011837 A2FE160/61W-VZL100-S *G*	R902038722 A2FE125/61W-VZL171-K	R902068744 A2FE125/61W-VZL171-K
R902011916 A2FE28/61W-VAL192J-SK	R902038748 A2FE90/61W-VZL181-K *G*	R902068802 A2FE45/61L-VXLXX0-S
R902014033 A2FE180/61W-XAL100-S *G*	R902038852 A2FE45/61W-VZL010J	R902068804 A2FE80/61L-VXLXX0-S *G*
R902014082 A2FE56/61W-VZL191J-K	R902038941 A2FE80/61W-VZL190J	R902068858 A2FE90/61W-VZL181-K
R902014100 A2FE80/61W-VAL192J-K	R902038943 A2FE80/61W-VZL192J-K	R902068863 A2FE107/61W-VZL181-K
R902014124 A2FE45/61W-VZL190J-S *G*	R902040005 A2FE63/61W-VZL181-K	R902070598 A2FE63/61W-VZL100-S
R902014126 A2FE45/61W-VZL191J-SK *G*	R902042461 A2FE56/61W-VZL020D-SK	R902070693 A2FE56/61W-VZL106-S
R902014127 A2FE56/61W-VZL190J-S *G*	R902043641 A2FE28/61W-VZL106	R902070712 A2FE107/61W-VAL100-S
R902014129 A2FE56/61W-VZL191J-SK *G*	R902043682 A2FE160/61W-VZL181-K	R902070715 A2FE180/61W-VAL100-S
R902014151 A2FE180/61W-XAL027-S	R902043857 A2FE45/61W-VAL106-S	R902073764 A2FE125/61W-VZL181-K
R902014185 A2FE90/61W-VZL106	R902045136 A2FE180/61W-VAL180-S	R902073768 A2FE107/61W-VZL181-K
R902014263 A2FE90/61W-VAL192J-SK *G*	R902045138 A2FE180/61W-VAL181-SK	R902073862 A2FE107/61W-VZL181-K
R902014440 A2FE90/61W-NAL300-J	R902047059 A2FE125/61W-VZL181-K	R902073937 A2FE80/61W-VAL106F
R902016526 A2FE80/61W-VAL180-S	R902047083 A2FE45/61W-VZL100J	R902073939 A2FE80/61W-VAL106F-K
R902016528 A2FE80/61W-VAL181-SK	R902047167 A2FE160/61W-VAL100-S	R902075008 A2FE125/61W-VZL181-K
R902016565 A2FE125/61W-NZL191 *G*	R902047252 A2FE28/61W-VAL191J-K	R902075031 A2FE160/61W-VZL181-K
R902016736 A2FE45/61W-VZL106 *G*	R902047317 A2FE80/61W-VAL181-K	R902075033 A2FE63/61W-VZL181-K
R902016988 A2FE32/61W-VAL190J	R902047347 A2FE125/61W-VZL171-K *G*	R902075084 A2FE107/61W-VALXXX-S

R902016990 A2FE32/61W-VAL192J-K	R902047348 A2FE107/61W-VZL170J	R902075099 A2FE63/61W-VZL181-K
R902018171 A2FE45/61W-VZL190J-S	R902047350 A2FE107/61W-VZL172J-K	R902075185 A2FE80/61W-VAL181-K
R902018173 A2FE45/61W-VZL191J-SK	R902047442 A2FE45/61W-VZL181-K	R902075258 A2FE180/61W-VAL191J-K
R902018399 A2FE32/61W-VBL100	R902049045 A2FE107/61W-VZL027	R902075266 A2FE56/61W-VAL181-K
R902018419 A2FE56/61W-VZL027	R902049053 A2FE63/61W-VZL010D *G*	R902075278 A2FE80/61W-VAL100F
R902018421 A2FE90/61W-VAL027	R902049057 A2FE63/61W-VZL100-S	R902075280 A2FE80/61W-VAL100F-K
R902018423 A2FE80/61W-VAL106	R902050543 A2FE90/61W-VAL181-SK	R902077123 A2FE56/61W-VAL181-K
R902018425 A2FE56/61W-VZL181-K	R902050642 A2FE56/61W-VZL181-K	R902077143 A2FE125/61W-VZL181-K
R902018442 A2FE80/61W-VAL181-K	R902057490 A2FE160/61W-VAL100-S	R902077260 A2FE80/61W-VAL027-S
R902018486 A2FE107/61W-VZL181-K *G*	R902060055 A2FE56/61W-VZL020	R902077378 A2FE56/61W-VZL181-K
R902021511 A2FE107/61W-VZL181-K *G*	R902060064 A2FE45/61W-VZL181-K	R902078513 A2FE56/61W-VZL181-K
R902021516 A2FE28/61W-VAL190J	R902060065 A2FE63/61W-VAL180-S	R902078519 A2FE160/61W-VZL181-K
R902021518 A2FE28/61W-VAL192J-K	R902060067 A2FE63/61W-VAL181-SK	R902078580 A2FE63/61W-VZL181-K
R902021740 A2FE45/61W-VZL106-S	R902060214 A2FE125/61W-VZL181-SK	R902078582 A2FE107/61W-VZL181-K
R902021751 A2FE56/61W-VAL106-S	R902060222 A2FE80/61W-VAL026D	R902078584 A2FE107/61W-XAL190J-S
R902021766 A2FE56/61W-VAL100-S	R902060224 A2FE80/61W-VAL026D-K	R902078996 A2FE45/61W-VZL181-K
R902021816 A2FE45/61W-VZL181-K	R902060230 A2FE63/61W-VAL106-S	R902080550 A2FE90/61W-VAL181-K
R902021818 A2FE80/61W-VAL181-K *G*	R902060244 A2FE90/61W-VAL190JD	R902080585 A2FE180/61W-VZL190J-S
R902021986 A2FE180/61W-VAL181-K	R902060246 A2FE90/61W-VAL192JD-K	R902080587 A2FE180/61W-VZL191J-SK
R902024546 A2FE32/61W-VAL191J-K	R902060292 A2FE125/61W-VZL181-K	R902080603 A2FE63/61W-VZL181-K
R902024547 A2FE45/61W-VZL192J-K	R902060294 A2FE90/61W-VAL181-K	R902080775 A2FE125/61W-VAL100-S
R902024565 A2FE45/61W-VZL190J	R902060339 A2FE107/61W-VZL171-SK	R902080882 A2FE32/61W-VAL181-K
R902024655 A2FE28/61W-VAL530	R902060454 A2FE125/61W-VZL180-S	R902080886 A2FE63/61W-VZL027-S
R902024673 A2FE125/61W-VZL190J	R902060456 A2FE125/61W-VZL181-SK	R902080969 A2FE63/61W-VZL020
R902024675 A2FE125/61W-VZL192J-K	R902060457 A2FE107/61W-VZL170-S	R902082130 A2FE180/61W-VAL100-S
R902024790 A2FE160/61W-VZL190J	R902060494 A2FE80/61W-VZL181-K	R902082143 A2FE80/61W-VAL181-K
R902024792 A2FE160/61W-VZL191J-K	R902060497 A2FE63/61W-VZL181-K	R902082148 A2FE160/61W-VZL181-K
R902024968 A2FE63/61W-VZL010	R902060499 A2FE125/61W-VZL171-K	R902082333 A2FE45/61W-VZL190J
R902027177 A2FE125/61W-VZL191J-K	R902063502 A2FE90/61W-VZL181-K	R902082336 A2FE56/61W-VZL190J *Z*
R902028891 A2FE45/61W-VZL026	R902063504 A2FE180/61W-VZL181-K	R902082447 A2FE107/61W-VZL180-S
R902030719 A2FE107/61W-VAL027	R902063698 A2FE56/61W-VZL027D-S	R902082449 A2FE107/61W-VZL181-SK
R902030956 A2FE180/61W-VAL190J	R902063700 A2FE56/61W-VZL027D-SK	R902082452 A2FE125/61W-VZL181-SK
R902030958 A2FE180/61W-VAL192J-K	R902063867 A2FE63/61W-VZL181-K	R902082453 A2FE56/61W-VZL180-S
R902031566 A2FE107/61W-VZL170	R902063893 A2FE80/61W-VAL181-K	R902082455 A2FE56/61W-VZL181-SK
R902031568 A2FE107/61W-VZL171-K	R902063895 A2FE90/61W-VAL181-K	R902082457 A2FE63/61W-VZL181-K
R902031796 A2FE90/61W-VAL191J-K	R902063918 A2FE28/61W-VAL181-K	R902084150 A2FE125/61W-VAL181-K
R902031806 A2FE56/61W-VZL180J	R902063950 A2FE63/61W-VZL181-K	R902084184 A2FE80/61W-VALXXXF-S
R902031808 A2FE56/61W-VZL181J-K	R902063959 A2FE32/61W-VAL181-K	R902084185 A2FE80/61W-VALXXXF-SK
R902031815 A2FE125/61W-VZL170	R902063962 A2FE125/61W-VZL181-K	R902084211 A2FE56/61W-VZL181-K
R902031817 A2FE125/61W-VZL171-K	R902063976 A2FE63/61W-VZL181-K	R902084279 A2FE125/61W-VZL192J-SK
R902033082 A2FE63/61W-VZL010J	R902063978 A2FE107/61W-VZL181-K	R902084286 A2FE160/61W-VZL192J-K
R902033154 A2FE56/61W-VAL106	R902063980 A2FE160/61W-VAL181-K	R902084377 A2FE160/61W-VZL181-K
R902036621 A2FE45/61W-VZL100D-S	R902065579 A2FE90/61W-XAL100J-S	R902084414 A2FE80/61W-VZL106