PORSCHE

928 S
Models 85, 86

928 S4
Models 87, 88, 89

928 S
928 S4

Technical Specifications

Table of Contents

Important Conversion Factors and New Dimensioning Units

	Former Units		Present Units
Pressure	technical atmosphere	at (kp/cm2)	Bar (bar)
Output	Horsepower	HP	Kilowatt (kW)
Force	Kilopond	kp	Newton (N)
Torque	Kilopondmeter	kpm	Newtonmeter (Nm)

Conversion Factors

at (kp/cm2)	in bar	x 0,981
kp	in N	x 9,81
HP	in kW	x 0,736
kpm	in Nm	x 9,81
m/s	in km/h	x 3,6
at	in mm Hg	x 735,56
km/h	in mph	x 0,621
oF	in oC	(oF-32) x 0,555
ltr.	in U.S. gal	x 0,264
ltr.	in Imp. gal	x 0,22

To convert the tightening torque from kpm in Nm the conversion factor 10 can be used, which is sufficient for workshop applications.

Survey of Type Designations

Model year Designation	Vehicle Type Designation A = Automatic	Engine Type Designation	Displacement (act.) (cm3)	Engine Output DIN-kW(HP) at 1/min	Stroke/ Bore (mm)	Compression Ratio ε
1985	928 S Eur., R.o.W.	M 28.21	4664	228(310)/5900	78.9/97	10,4:1
	928 S Eur., R.o.W.	A M 28.22	4664	228(310)/5900	78.9/97	10,4:1
	928 S USA, CAN	M 28.43	4957	215(292)/5750	78.9/100	10,0:1
	928 S USA, Jap., CAN	A M 28.44	4957	215(292)5750	78.9/100	10,0:1
1986	928 S Eur., R.o.W.	M 28.21	4664	228(310)/5900	78.9/97	10,4:1
	928 S Eur., R.o.W.	A M 28.22	4664	228(310)/5900	78.9/97	10,4:1
	928 S USA	M 28.43	4957	215(292)/5750	78.9/100	10,0:1
	928 S USA, Jap.	A M 28.44	4957	215(292)/5750	78.9/100	10,0:1
	928 S AUS M-298/299	M 28.45	4957	212(288)/5750	78.9/100	9,3:1
	928 S AUS M-298/299	A M 28.46	4957	212(288)/5750	78.9/100	9,3:1
	928 S Sweden, CH	M 28.21	4664	202(275)/5750	78.9/97	9,3:1
	928 S Sweden, CH	A M 28.22	4664	202(275)/5750	78.9/97	9,3:1
1987	928 S4 Eur., R.o.W.	M 28.41	4957	235(320)/6000	78.9/100	10,0:1
	928 S4 Eur., R.o.W.	A M 28.42	4957	235(320)/6000	78.9/100	10,0:1
	928 S4 USA	M 28.41	4957	235(320)/6000	78.9/100	10,0:1
	928 S4 USA	A M 28.42	4957	235(320)/6000	78.9/100	10,0:1
	928 S4 AUS	M 28.41	4957	221(300)/6000	78.9/100	10,0:1
	928 S4 AUS	A M 28.42	4957	221(300)/6000	78.9/100	10,0:1
1988	928 S4 R.o.W.	M 28.41	4957	235(320)/6000	78.9/100	10,0:1
	928 S4 R.o.W.	A M 28.42	4957	235(320)/6000	78.9/100	10,0:1
	928 S4 USA	M 28.41	4957	235(320)/6000	78.9/100	10,0:1
	928 S4 USA	A M 28.42	4957	235(320)/6000	78.9/100	10,0:1
	928 S4 AUS	M 28.41	4957	221(300)/6000	78.9/100	10,0:1
	928 S4 AUS	A M 28.42	4957	221(300)/6000	78.9/100	10,0:1
1989	928 S4 R.o.W.	M 28.41	4957	235(320)/6000	78.9/100	10,0:1
	928 S4 R.o.W.	A M 28.42	4957	235(320)/6000	78.9/100	10,0:1
	928 S4 USA	M 28.41	4957	235(320)/6000	78.9/100	10,0:1
	928 S4 USA	A M 28.42	4957	235(320)/6000	78.9/100	10,0:1
	928 GT R.o.W.	M 28.47	4957	243(330)/6200	78.9/100	10,0:1
	928 GT USA	M 28.47	4957	243(330)/6200	78.9/100	10,0:1

Fuel system B= unleaded Sb= Premium grade-unleaded Sv= Premium grade-leaded	Engine Number Codes	Transmission Type	Chassis Number Codes
LH-Jetronic (Sv)	82F00001-05000	G 28.10	WPO ZZZ 92 Z FS 84 0001-5000
LH-Jetronic (Sv)	82F05001-10000	A28.05/06	WPO ZZZ 92 Z FS 84 0001-5000
LH-Jetronic (Sb)	81F00001-05000	G 28.11	WPO JBO 92 - FS 86 0001-5000
LH-Jetronic (Sb)	81F05001-10000	A 28.04	WPO ZZZ 92 - ZFS 84 9501-9999
LH-Jetronic (Sv)	82G00001-05000	G 28.10	WPO ZZZ 92 Z GS 84 0001-5000
LH-Jetronic (Sv)	82G05001-10000	A 28.08	WPO ZZZ 92 Z GS 84 0001-5000
LH-Jetronic (Sb)	81G00001-05000	G 28.11	WPO IBO 92 - GS 86 0001-5000
LH-Jetronic (Sb)	81G05001-10000	A 28.07	WPO ZZZ 92 Z GS 84 9501-9999
LH-Jetronic (B)	89G00001-05000	G 28.10	WPO ZZZ 92 Z GS 84 0001-5000
LH-Jetronic (B)	89G05001-10000	A 28.11	WPO ZZZ 92 Z GS 84 0001-5000
LH-Jetronic (B)	82G00001-05000	G 28.10	WPO ZZZ 92 Z GS 84 0001-5000
LH-Jetronic (B)	82G05001-10000	A 28.09	WPO ZZZ 92 Z GS 84 0001-5000
LH-Jetronic (Sb)	81H00001-01000	G 28.12	WPO ZZZ 92 Z HS 84 0001-5000
LH-Jetronic (Sb)	81H05001-10000	A 28.14	WPO ZZZ 92 Z HS 84 0001-5000
LH-Jetronic (Sb)	81H00001-01000	G 28.13	WPO JBO 92 - HS 86 0001-5000
LH-Jetronic (Sb)	81H05001-10000	A 28.12	WPO JBO 92 - HS 86 0001-5000
LH-Jetronic (B)	81H00001-01000	G 28.12	WPO ZZZ 92 Z HS 84 0001-5000
LH-Jetronic (B)	81H05001-10000	A 28.14	WPO ZZZ 92 Z HS 84 0001-5000
LH-Jetronic (Sb)	81J00001-05000	G 28.12	WPO ZZZ 92 Z JS 84 0001-5000
LH-Jetronic (Sb)	81J05001-10000	A 28.14	WPO ZZZ 92 Z JS 84 0001-5000
LH-Jetronic (Sb)	81J00001-05000	G 28.13	WPO JBO 92 - JS 86 0001-5000
LH-Jetronic (Sb)	81J05001-10000	A 28.12	WPO JBO 92 - JS 86 0001-5000
LH-Jetronic (B)	81J00001-05000	G 28.12	WPO ZZZ 92 Z JS 84 0001-5000
LH-Jetronic (B)	81J05001-10000	A 28.14	WPO ZZZ 92 Z JS 84 0001-5000
LH-Jetronic (Sb)	81K00001-05000	G 28.12	WPO ZZZ 92 Z KS 84 0001-5000
LH-Jetronic (Sb)	81K05001-10000	A 28.16	WPO ZZZ 92 Z KS 84 0001-5000
LH-Jetronic (Sb)	81K00001-05000	G 28.12	WPO JBO 92 - KS 86 0001-5000
LH-Jetronic (Sb)	81K05001-10000	A 28.16	WPO JBO 92 - KS 86 0001-5000
LH-Jetronic (Sb)	85K00001-10000	G 28.55	WPO ZZZ 92 Z KS 84 0001-5000
LH-Jetronic (Sb)	85K00001-10000	G 28.55	WPO JBO 92 - KS 86 0001-5000

Engine Number Codes from Modell 85

Explanation of digits:

1 2 3 4 5 6 7 8

Engine Number	Engine type	Model Year	Serial Number
8 = 8 cyl. engine	2 = 928/4,7 ltr. R.o.W. 1 = 928/5,0 ltr. USA	F = 1985	00001...99999
8 = 8 cyl. engine	1 = 928/5,0 ltr. USA 2 = 928/4,7 ltr. R.o.W.	G = 1986	00001...99999
8 = 8 cyl. engine	1 = 928/5,0 ltr. worldwide	H = 1987	00001...99999
8 = 8 cyl. engine	1 = 928/5,0 ltr. worldwide	J = 1988	00001...99999
8 = 8 cyl. engine	1 = 928/5,0 ltr. worldwide 5 = 928/5,0 ltr. GT worldwide	K = 1989	00001...99999

Chassis Number Codes (Model 88)

WPO	ZZZ	92	Z	J	S	8	4	0001-5000	**Europe/Rest of world**
WPO	ZZZ	92	Z	J	S	8	4	9501-9999	**Japan**
WPO	JAO	92	-	J	S	8	6	0001-5000	**USA/Canada**

- Serial number
- Code for body and engine
- 3rd digit of type
- Place of production
- Model year (F = 1985, G = 1986, H = 1987, J = 1988, K = 1989)
- Test code
- 1st and 2nd digit of type
- VDS-Code USA
- World manufacturer code

Engine Type Designation

Mfg. Year	Model-Year	Type Desig-nation	Displ. (cm3)	Engine output acc. DIN (kW/HP)	Fuel System	Installed in Cars for	A = Automatic
1984/85	1985	M 28.21	4664	228(310)	LH-Jetronic	928 S Europe, R.o.W.	
		M 28.22	4664	228(310)	LH-Jetronic	928 S Europe, R.o.W.	A
		M 28.43	4957	215(292)	LH-Jetronic	928 S USA, Canada	
		M 28.44	4957	215(292)	LH-Jetronic	928 S USA, Japan, Canada	A
1985/86	1986	M 28.21	4664	228(310)	LH-Jetronic	928 S Europe, R.o.W.	
		M 28.22	4664	228(310)	LH-Jetronic	928 S Europe, R.o.W.	A
		M 28.43	4957	215(292)	LH-Jetronic	928 S USA	
		M 28.44	4957	215(292)	LH-Jetronic	928 S USA, Japan	A
		M 28.45	4957	212(288)	LH-Jetronic	928 S Austr. M-298/299	
		M 28.46	4957	212(288)	LH-Jetronic	928 S Austr. M-298/299	A
		M 28.21	4664	202(275)	LH-Jetronic	928 S Sweden, Switzerland	
		M 28.22	4664	202(275)	LH-Jetronic	928 S Sweden, Switzerland	A
1986/87	1987	M 28.41	4957	235(320)	LH-Jetronic	928 S4 worldwide	
		M 28.42	4957	235(320)	LH-Jetronic	928 S4 worldwide	A
		M 28.41	4957	221(300)	LH-Jetronic	928 S4 Australia	
		M 28.42	4957	221(300)	LH-Jetronic	928 S4 Australia	A
1987/88	1988	M 28.41	4957	235(320)	LH-Jetronic	928 S 4 worldwide	
		M 28.42	4957	235(320)	LH-Jetronic	928 S4 worldwide	A
		M 28.41	4957	221(300)	LH-Jetronic	928 S4 Australia	
		M 28.42	4957	221(300)	LH-Jetronic	928 S4 Australia	A
1988/89	1989	M 28.41	4957	235(320)	LH-Jetronic	928 S4 worldwide	
		M 28.42	4957	235(320)	LH-Jetronic	928 S4 worldwide	A
		M 28.47	4957	243(330)	LH-Jetronic	928 GT worldwide	

Transmission Number Codes as from Model 85

1	1	F	00001
Engine Code 1 = transm. for 8-cyl. Engine	Transmission Type 1 = 5-speed man. 6 = Autom. transm.	Model year F = 1985 G = 1986 H = 1987	Serial Number

Note:
The number 12 preceding the transmission number means that the transmission is fitted with a limited slip differential (40 %).

Transmission Type Designations

Trans-mission type	Number of speeds	Installed in car type	Installed as from transm. number code	Remarks
Mod. 85				
G 28.10	5	928 S	11F00001	Manual transmission, Europe, R.o.W.
G 28.11	5	928 S	11F05001	Manual transmission, USA
A 28.04	4	928 S	16F00001	Automatic, USA, Japan
A 28.05	4	928 S	16F05001	Automatic, Europe, R.o.W. (14:33)
A 28.06	4	928 S	16F10001	Automatic, Europe, R.o.W. (13:33)
Mod. 86				
G 28.10	5	928 S	11G00001	Manual transmission, Europe, R.o.W.
G 28.11	5	928 S	11G05001	Manual transmission, USA
A 28.07	4	928 S	16G00001	Automatic, USA, Japan
A 28.08	4	928 S	16G05001	Automatic, Europe, R.o.W. (14:33)
A 28.09	4	928 S	16G10001	Automatic, Schweden, Switzerland (13:33)
A 28.11	4	928 S	16G15001	Automatic, Australia, R.d.W.
Mod. 87				
G 28.12	5	928 S4	11H00001	Manual transmission, Europe, R.o.W.
G 28.13	5	928 S4	11H05001	Manual transmission, USA
A 28.12	4	928 S4	16H00001	Automatic, USA
A 28.14	4	928 S4	16H10001	Automatic, Europe, R.o.W.

Transmission Number Codes as from Model 88

G 2812	2	J	10864
Transm. Type	Index for variants within the assembly number 0 = no differential 1 = normal differential 2 = ZF limited slip differential (M 220)	Model year J = 1988 K = 1989	Serial Number

Attention: The transmission nos. 1...100 and nos. 301...400 of each type have been reserved for experimental transmissions and for special-purpose transmissions, respectively. The first consecutive production no. is 501
Example: G 2812 2 J 10864
Transmission G 28 for R.o.W. applications with differential lock, manufactured for 1988 model year as 364th production transmission (with differential lock).

Transmission Type Designations

Trans-. mission type	Number of speeds	Installed in car type	Installed as from transm. number code	Remarks
Mod. 88				
G 28.12	5	928 S4	G 2812 1 J 00001	Manual transm., R.o.W.
G 28.12	5 (M 220)	928 S4	G 2812 2 J 10001	Manual transm., R.o.W.
G 28.13	5	928 S4	G 2813 1 J 00001	Manual transm., USA
G 28.13	5 (M 220)	928 S4	G 2813 2 J 10001	Manual transm., USA
A 28.12	4	928 S4	A 2812 1 J 00001	Automatic, USA
A 28.12	4 (M 220)	928 S4	A 2812 2 J 10001	Automatic, USA
A 28.14	4	928 S4	A 2814 1 J 00001	Automatic, R.o.W.
A 28.14	4 (M 220)	928 S4	A 2814 2 J 10001	Automatic, R.o.W.
Mod. 89				
G 28.12	5	928 S4	G 2812 1 K 00001	Manual transm., worldwide
G 28.12	5 (M 220)	928 S4	G 2812 2 K 00001	Manual transm., worldwide
A 28.16	4	928 S4	A 2816 1 K 00001	Automatic, worldwide
A 28.16	4 (M 220)	928 S4	A 2816 2 K 00001	Automatic, worldwide
G 28.55	5 (M 220)	928 S4	G 2855 2 K 00001	Manual transm., Club Sport, worldwide
G 28.55	5 (M 220)	928 GT	G 2855 2 K 00001	Manual transm., worldwide

Technical Data - Type 928 S/928 S4 Engine Data from Model 85...89

Model Year		**85/86**	**85/86**	**86**	**87...89**	**89**
Engine Type		**928 S M 28.21/22**	**928 S M 28.43/44**	**928 S M 28.45/46**	**928 S4 M 28.41/42**	**928 GT M 28.47**
Engine						
No. of cylinders		8	8	8	8	8
Bore	mm/in.	97,0 (3,82)	100 (3,94)	100 (3,94)	100 (3,94)	100 (3,94)
Stroke	mm/in.	78,9 (3,11)	78,9 (3,11)	78,9 (3,11)	78,9 (3,11)	78,9 (3,11)
Displacement (actual)	cm3/in.3	4664 (284,60)	4957 (302,5)	4957 (302,5)	4957 (302,5)	4957 (302,5)
Displacement (rounded down)	cm3	4632	4898	4898	4898	4898
Compression ratio		10,4:1	10,0:1	9,3:1	10,0:1	10,0:1
Max. engine power 80/1269/EWG	kW/HP	228/310	215/292	212/288	235/320 Austr. 221/300	243/330
(Net Power, SAE J 1349)	kW/HP		215 (288)		235 (316)	
At engine speed	rpm	5900	5750	5750	6000	6200
Max. liter output 80/1269/EWG	Nm/kpm	400/40,7	410/42	400/40,8	430/43,9 420/42,8	430/43,9
(Net Torque, SAE J 1349)	Nm/lb ft		410 (302)		430 (316,9)	
At engine speed	rpm	4100	2700	2700	3000	4100
Max. specific power DIN 70020	kW/L/HP/L	49/67	43,4/59,0	42,8/58,1	47,4/64,6 44,6/60,5	49,0/66,6
(SAE J 1349)	kW/L/HP/L		43,0 (58,2)		47,4 (63,7)	
Fuel octane rating	RON	98 premium grade	96 unleaded	91unleaded	95 unleaded 91	95 unleaded
Fuel cut-off to limit engine speed at	rpm	6400	6400	6400	6600	6800
Idle speed	rpm	700 + 50	680 + 20	680 + 20	675 + 25	775 + 25
Engine weight (dry)	kg	261	264	264	264	264

Note: USA values in brackets.

Technical Data Type 928 S Engine Type M 28.21/22 (4,7l)

Engine Design		
Design		8 cylinder, four stroke, internal combustion V-Engine
Crankcase		Two-piece, light alloy cylinder/crankcase, without liners
Crankshaft		Forged with 5 plain bearings
Connecting rods		Sinter-forged steel
Pistons		Cast light alloy with chrome or iron plated bearing surfaces
Camshaft		Cast, running in camshaft housing without bearing shells
Camshaft drive		Toothed belt with tightening roller
Cylinder head		Light alloy
Arrangement of valves		1 intake, 1 exhaust in line overhead
Valve timing		By overhead camshaft and hydraulic bucket tappets
Valve play		Automatic (hydraulic) adjustment
Timing (1 mm stroke, zero play)	Intake opens	6° after TDC
	Intake closes	54° after BDC
	Exhaust opens	43° before BDC
	Exhaust closes	4° before TDC
Engine Cooling		Closed coolant-filled system, mechanical fan with visco-clutch (when air conditioner is installed as extra equipment, with extra electric fan and thermal switch)
Engine Lubrication		Forced oil circulation system with crescent pump
Oil filter		Full flow type
Oil pressure at 4000/min		approx. 5 bar for oil temp., between 80...100 oC
Oil pressure indicators		Indicator lamp and pressure gauge
Oil consumption	l/1000 km	approx. 1,5
Exhaust System		Continuous twin pipes, primary, intermediate and final mufflers
Emission control		Secondary air injection

Technical DataType 928 S Engine type M 28.21/22 (4,7l)

Heater			Warm water heater with heat exchanger and blower
Fuel system			LH-Jetronic
Fuel delivery			1 electric fuel delivery pump
Fuel Grade RON			98
Fuel Consumption		Manual	Automatic
constant 90 km/h	l/100 km	8.7	8.6
constant 120 km/h	l/100 km	10.2	10.5
ECcity cicle	l/100 km 19.2	16.7	
Electrical System			
Shielding class			ECE-R 10 und 72/245/EWG
Battery voltage	V		12
Battery capacitance	Ah		88 (72 as from Mod. 86)
Alternator/output	A/W		115/1610
Ignition			by EZF breakerless
Firing order			1-3-7-2-6-5-4-8
Ignition timing			by
EZF			
Spark splugs			Bosch WR 7 DC
Spark plug electrode gap	mm		0,7 + 0.1
Power Transmission			Engine mounted at front end, transmission mounted at rear end, both connected by a connecting pipe – transaxle system. Front mounted engine, clutch, torsional elastic drive shaft to transmission running in connecting tube, rear mounted transmission with final drive, double joint shafts, rear wheels
Clutch			Two plate, dry clutch with diaphragm springs in pulled versions, located on engine end
Pressure plate			MFZ 200

Technical Data Type 928 S/928 S4 (32-Ventiler 5,0 l)

Changes (values) in model year 85/86
Engine type M 28.43/44/45/46

Arrangements of valves	2 intake, 2 exhaust, overhead V	
Valve timing	2 overhead camshafts per cylinder bank	
Camshaft drive	Toothed belt and internal chain	
Timing (1 mm stroke, zero play)	Intake opens	11° after TDC
	Intake closes	50° after BDC
	Exhaust opens	30° before BDC
	Exhaust closes	5° before TDC
Exhaust System	Twin pipes entire length 3-way catalytic converter, twin pipes in final muffler	
Emission Control	3-way catalytic converter, secondary air injection	

Changes (values) in model year 87/88/89
Engine type M 28.41/42/47

Connecting rods	Stahl, gegossen oder sintergeschmiedet		
Arrangements of valves	2 Input, 2 Output, overhead V		
Valve timing	2 overhead camshafts per cylinder bank		
Camshaft drive	Toothed belt and internal chain		
Timing (1 mm stroke, zero play)	Input opens	11° after TDC (3°)	(Club Sport
	Input closes	36° after BDC (42°)	
	Exhaust opens	17° before BDC (30°)	and GT)
	Exhaust closes	2° before TDC (5°)	
Blower drive	Double electric fan		
Ignition timing	EZK breakerless		
Clutch	Single-plate dry clutch with diaphragm spring, extended mounted on engine		
Pressure plate	GMFZ 250		

Torque Specifications – Engine M 28.21/22/43/44/45/46/41/42/47

Location	Tightening Method	Tightening Torque Nm	Thread
Main bearing bolt	3 stages: 1st stage 2nd stage 3rd stage	30 55 75 + 5	M 12 x 1,5
Main bearing bolt	2 stages: 1st stage 2nd stage	20 50 + 5	M 10
Oil pump bolt	2 stages: 1st stage 2nd stage	15 20	M 8
Conrod nut with ribbed surface		75	M 10 x 1,25
Cylinder head bolt with stud bolt	Torquing angle tightening method: 1st stage 2nd stage 3rd stage 4th stage	 20 90° torquing angle 90° torquing angle 90° torquing angle	
Cylinder head bolt with hexagon nut	1st stage 2nd stage 3rd stage	20 90° torquing angle 90° torquing angle	
Camshaft bearing bridges to cylinder head		10 20	M 6 M 8
Camshaft housing to cylinder head		20	M 8
Screw plug to camshaft housing		40	M 18 x 1,5

Location	Tightening Method	Tightening Torque Nm	Thread
Water drain plug radiator		1,5	M 10
Screw socket on radiator on engine		 70 70	
Oil hose to screw socket on upper section of crankcase		70	M 26 x 1,5
on radiator		70	M 26 x 1,5
Temperature switch radiator		40	
Thermostat housing for cooling circuit to engine	2 stages: 1st stage 2nd stage	10 20 + 2	M 8
Remote thermometer sending unit – Water temperature		25 - 30	
Non-return valve		55	
Air line		30	
Oxygen sensor		55	M 18 x 1,5
Screw plug exhaust removal at catalytic converter		15	M 8 x 1
Temperature sensor NTC II to thermostat housing		12	

Location	Tightening Method	Tightening Torque Nm	Thread
Allen screws for chain tensioner		10	M 6
Hollow-core screw/ chain tensioner		10	M 8 x 1
Non-return valve/ chain tensioner		15	M 10 x 1
Camshaft bolt		65	M 10 x 1,5
Cover for cylinder head		10	M 6
Spark plugs		25 bis 30	M 14 x 1,25
Flywheel bolt	2 stages: 1st stage 2nd stage	40 90	M 10 x 1,25
VEE-belt pulley attachment		295	M 18 x 1,5
Oil drain plug		50	M 20 x 1,5
Screw plug Thermostat housing		80	M 48 x 1,5
Oil pressure sending unit		35	M 18 x 1,5
Screw plug Pressure control valve		40	M 18 x 1,5
Screw connec. piece Bypass valve		70	M 24 x 1,5
Water drain plug – cylinder block		35	M 12 x 1,5

Location	Tightening Method	Tightening Torque Nm	Thread
Knock sensor mounting	without washer	20	M 8
Intake manifold mounting		15	M 8
Hall sensor mounting		8	M 6
Mounting CO emission line to exhaust manifold		25	
Cap nut to fuel distributing pipe		12	M 12 x 1,5
Union nuts to fuel distributing pipe		30	M 16 x 1,5
All remaining bolts and nuts			
M 6		8 + 2	
M 8		20 + 2	
M 10		40 + 5	

Tolerances and Wear Limits – Engine

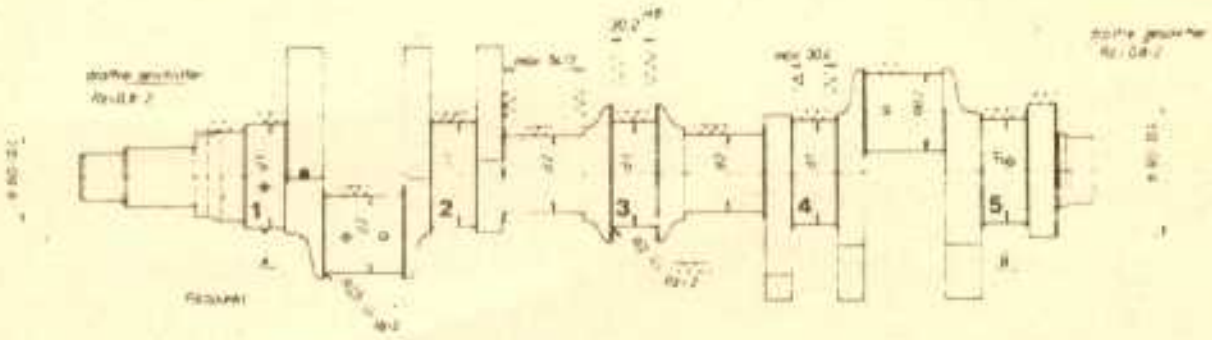
		Engine type M 28.21/22 When installed (new)	Wear Limits	Engine type M28.43/44/45/46/41/42/47 When installed (new)	Wear Limits
Cooling System					
Coolant thermostat	opens at temperature	81...85°C		81...85°C	
Cap for cooling system					
Pressure valve	opens at	0.9...1.15 bar		0.9...1.15 bar	
Vacuum valve	opens at	0.07...0.12 bar		0.07...0.12 bar	
Oil circuit System					
Oil consumption	ltr./1000 km		up to approx. 1.5		up to approx. 1.5
Oil pressure		at 4000/min		at 3000/min	
at 80°C oil temperature		approx. 5 bar		approx. 5 bar	
Oil dipstick					
Oil volume		7.5 ltr.		7.5 ltr.	
Amount of oil between	min.-max.-	1.5 ltr.		1.5 ltr.	
Oil pump	axial play	0.080...0.120		0.080...0.120	
	radial play	0.060...0.088		0.060...0.088	
Valve Timing					
Bore dia. for camshaft		$60.5^{+0.03}_{-0}$		$28^{+0.021}_{-0}$	
Camshaft dia.		$60,5^{-0.03}_{-0.045}$		$28^{-0.04}_{-0.055}$	
Camshaft axial play		0.09...0.12	0.20	0.08...0.18	
Bore dia. for bucket tappet		$38^{+0.010}_{-0.038}$		$35^{+0.015}_{-0.005}$	
Bucket tappet dia.		$38^{-0.018}_{-0.034}$		$35^{-0.025}_{-0.041}$	
Camshaft runout		0.02		0.02	
Cylinder Head and Valves					
Bearing surface distortion		max. 0.03		max. 0.03	
Valve seat					
Intake	width	1.7		1.5	
Exhaust	width	2.0		1.8	
Intake	Seat angle	45°		45°	
Exhaust	Seat angle	45°		45°	
Outer correction angle		30°			
Inner correction angle		60°		60°	
Valve guides					
Intake and Exhaust dia.		9 +0.015		7 +0.015	
Valve stem dia.:					
Intake	dia.	8.97 -0.012		6.97 -0.012	
Exhaust	dia.	8.95 -0.012		6.94 -0.012	

Tolerances and Wear Limits – Engine

		Engine type M 28.21/22 When installed (new)	Wear Limits	Engine type M 28.43/44/45/46/41/42/47 When installed (new)	Wear Limits
Valve guide/valve stem	**clearance**				
Intake			0.80		0.80
Exhaust			0.80		0.80
Compression		8 bar and above	6.5 bar	8 bar and above	6.5 bar
Pistons and Connecting Rods					
Cylinder/piston	clearance	0.024...0.048	app.0.080	0.008...0.032	app. 0.080
		Mahle K.S.		Mahle K.S.	
Piston rings	Side Nut 1	0.06... 0.05...		0.05... 0.04...	
	clearance	0.102	0.082	0.082	0.072
	Nut 2	0.04... 0.05...		0.04... 0.02...	
		0.072 0.082		0.072 0.072	
	Nut 3	0.013... 0.023...		0.036...0.036...	
		0.127 0.137		0.136 0.136	
Piston rings	end gap	Nut 1 = 0.20...0.40		Nut 1 = 0.20...0.40	
		Nut 2 = 0.20...0.40		Nut 2 = 0.20...0.40	
		Nut 3 = 0.40...1.40		Nut 3 = 0.40...0.90	
Conrod bushing	dia.	24 +0,018 +0.028		24 +0.018 +0.028	
Piston pin	dia.	24 -0.004		24 -0.004	
Conrod bushing/piston pin	radial play	0.018...0.032		0.018...0.032	
Crankshaft and Engine Block					
Crankshaft (measured on 2nd, 3rd or 4th bearing, bearings 1 and 5 on v-blocks)	runout	0.04	max. 0.06	0.04	max. 0.06
Conrod bearing journal	dia.	51.971. .51.990		51.971...51.990	
Conrod bearing/crankshaft	radial play	0.034...0.092		0.027...0.069	
	axial play	0.100...0.400		0.08...0.24	
Crankshaft bearing journal	dia.	69.971...69.990		69.971...69.990	
Crankshaft bearing/ crankshaft	radial play	0.020...0.098	0.16	0.028...0.070	0.16
Crankshaft bearing/ crankshaft	axial play	0.110...0.312	0.40	0.06...0.192	0.40
Cylinder bore	out of rue	0.010	0.020	0.010	0.020

Crankshaft – Standard and Reconditioned Sizes

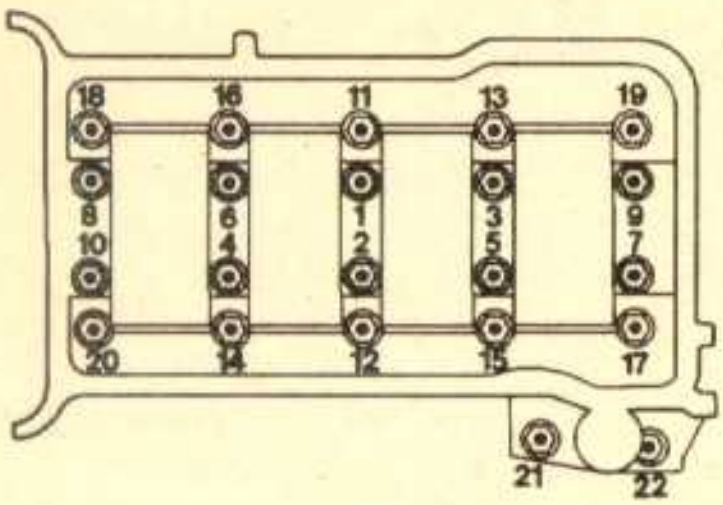
Size	Crankcase Bore Ø	Crankshaft Bearing Journal d1 Ø	Crankshaft Conrod Bearing Journal d2 Ø	Thrust Bearing 3 Width
Standard	Standard	69.971...69.990	51.971...51.990	Max. 30.08
-0.25	75.000...75.019	69.721...69.740	51.721...51.740	Reconditioned size
-0.50	Oversize	69.471...69.490	51.471...51.490	30.200...30.239
	75.250...75.269			



Only grind bearing surfaces for oil seals as much as necessary. Otherwise repolish as required Rz = 0.8...2. After grinding, give oil bores a radius of R = 0.5 mm. Break sharp edges with a radius R = 0.2...0.5mm.

Reconditioned Size Color Codes
1st reconditioned size dot of blue paint
2nd reconditioned size dot of green paint

Tightening Sequence - Upper and Lower Crankcase Sections

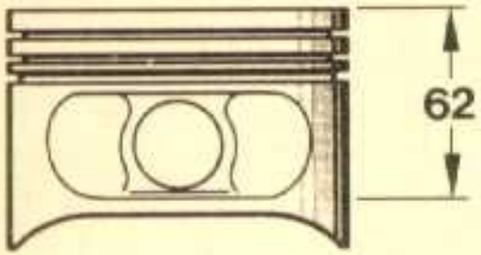


Tightening sequence:		Tightening torque
Number 1...10 in 3 steps:	1. step	30 Nm
Thread M 12x1,5	2. step	55 Nm
	3. step	75 + 5 Nm
Number 11 ... 22 in 2 steps:	1. step	20 Nm
Thread M10	2. step	50 + 5 Nm

Checking Pistons and Cylinder Bores

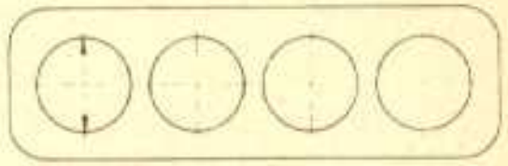
Checking Piston

Measure about 62 mm from piston crown, offset to piston pin axis by 90°.



Checking Cylinder Bores

Measure about 62 mm from cylinder bore upper edge, transverse to engine block.
Note:
To measure, install crankcase lower section and tighten to specified torque.



Engine Type M 28.21/22

Size	Piston Dia. (mm) Mahle	Cylinder Bore Dia. (mm)	Tolerance Group Code
Standard	96,965 96,975 ± 0,005 96,985	97,000 97,010 ± 0,005 97,020	0 1 2
1st oversize	97,465 97,475 ± 0,005 97,485	97,500 97,510 ± 0,005 97,520	0 KD 1 1 KD 1 2 KD 1
2nd oversize	97,965 97,975 ± 0,005 97,985	98,000 98,010 ± 0,005 98,020	0 KD 2 1 KD 2 2 KD 2

Only pair pistons and cylinders of the same tolerance group.
Different tolerance groups could be used in one engine.

Checking Pistons and Cylinder Bores (32 valves)

Engine Type M 28.43/44/45/46

Size	Piston Dia. (mm) Kolbenschmidt	Cylinder Bore Dia. (mm)	Tolerance Group Code
Standard	99,975 99,985 ±0,007 99,995	100,000 100,010 ±0,005 100,020	0 1 2
1st Oversize	100,475 100,485 ±0,007 100,495	100,500 100,510 ±0,005 100,520	1 0 1 1 1 2

Engine Type M 28.41/42/47

Size	Piston Dia. (mm) Kolbenschmidt	Cylinder Bore Dia. (mm)	Tolerance Group Code
Standard	99,980 99,990 ±0,007 100,000	100,000 100,010 ±0,005 100,020	0 1 2
1st Oversize	100,480 100,490 ±0,007 100,500	100,500 100,510 ±0,005 100,520	1 0 1 1 1 2

Only pair pistons and cylinders of the same tolerance group.
Different tolerance groups could be used in one engine.

Piston Allocation (Sizes, Weights and Compressions)

Engine M 28.21/22

Europe and Rest of World
Compression 10,4:1
Nominal Dia. 97 mm

Engine M 28.21/22

Sweden, Switzerland
Compression 9,3:1
Nominal Dia. 97 mm

Piston Weight = 722 g. Permissible tolerance = ± 4 g

(32-Ventiler)

Engine M 28.43/44

USA, Canada und Japan
Compression 10,0:1
Nominal Dia. 100,0 mm

Engine M 28.45/46

Austr. M-298/299
Compression 9,3:1
Nominal Dia. 100,0 mm

Motor M 28.41/42/47

worldwide
Compression 10,0:1
Nominal Dia. 100,0 mm

Piston weight = 765 g Permissible tolerance = ± 4 g

Piston WeightsTolerances

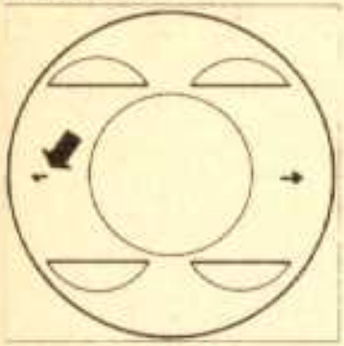
Pistons and piston pins are paired in accordance with weight selection. Piston weighed with parts (piston pin, piston rings, flap rings).

Piston pins must always remain assigned to the corresponding piston and must not be interchanged even within one engine set. Observe allocation during dissembly and assembly of engine, mark if necessary.

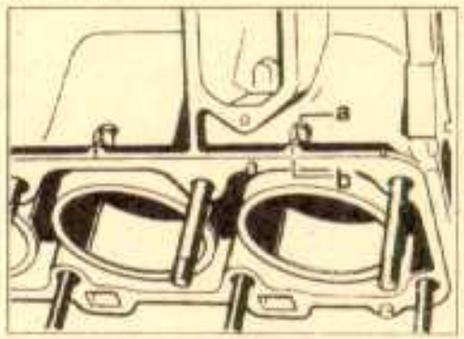
If piston pins have been interchanged by mistake, reallocation must be carried out by checking the total weight.

Pistons and Cylinder Codes

Code for piston
on piston crown

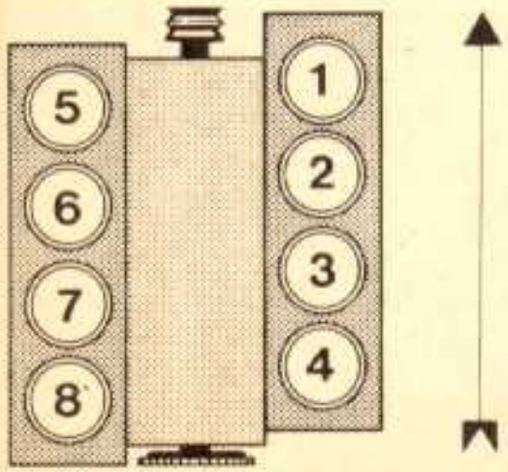


Code for cylinder
on engine block



a - Cylinder code (location)
b - Tolerance group

Cylinder Codes (Numbers)



Firing Order 1-3-7-2-6-5-4-8

Notes for Installing Pistons (32-valve engines)

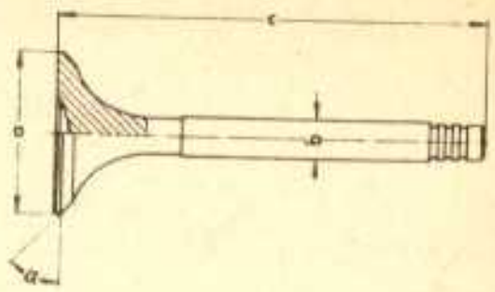
The "AV -" (exhaust valve) inscribed on the base of the piston indicates the installation position (arrow toward exhaust side).

The valve cutouts for the valves are of equal size on both sides. The installation position is indicated by an arrow which points toward the belt pulley.

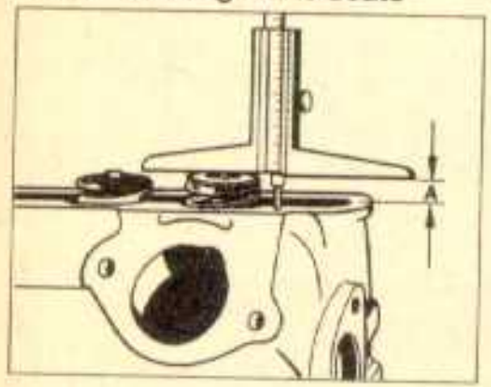
Valve Dimension

Engine Type M 28.21/22

Size	Intake	Exhaust
a	45,00 mm	40,00 mm
b	8,97 mm	8,95 mm
c	110,50 mm	110,90 mm
a	45°	45°



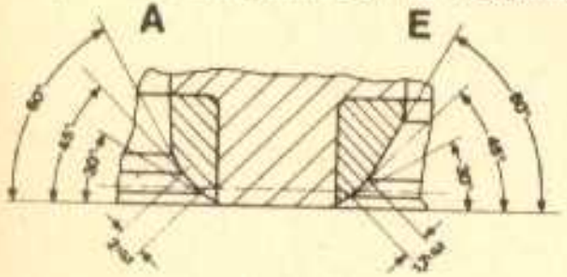
Reconditioning Valve Seats



Valve seats can be machined up to the wear limit point, distance "A" =14,5 mm, (new size is 13,65 ± 0,45).

Check with a new valve. Distance "A" must not be exceeded, since otherwise the function of the hydr. valve followers could not be guaranteed.

Angles and Dimensions of Valve Seat Inserts



Installed Length and Colour Code of Valve Springs

colour code - 2 or 3 white lines -

Intake valve	41,0 + 0,5 mm
Exhaust valve	40,0 + 0,5 mm

Check installed length with special tool 9138/1 and correct by installing or removing shims if necessary.

Checking Valve Seat Wear Limit and Valve Guide (32-valve engines)

Note:
Distinguishing feature, cylinder head

85/86 models M 28.43/44/45/46	87 models onward M 28.41/42/47
Bearing bridge attachment M 6	M 8
Exhaust manifold attachment 2-bolt flange	3-bolt flange

Size worn	Intake valve	Exhaust valve
85/86 mod.	43,0 mm	42,1 mm
87 mod. onward	44,4 mm	43,4 mm

Use the valve to be installed and measure from the end of the valve stem to the contact face of the valve spring stop in the cylinder head.

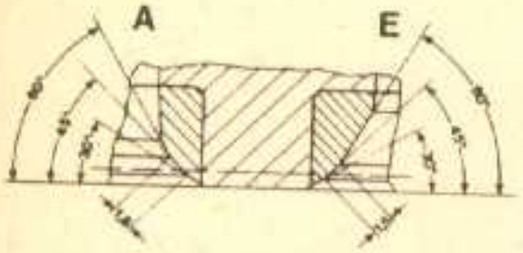
While measuring, hold the valve firmly against the valve seat.

Checking valve guide

Measure valve guide at 10 mm valve lift (distance between valve head and valve seat).
Wear limit for intake and exhaust valve guide = 0,80 mm.

Valve Seat Angle and Valve Dimensions (32-valve engines)

Valve Seat Angle



Intake-valve face width	1,5 mm
Exhaust-valve face width	1,8 mm

Valve Dimensions 928 S

Mod. 85/86 onward

Motortyp M 28.43/44/45/46

Dim.	Intake	Exhaust
a	35,00mm	32,00mm
b	6,97mm	6,94mm
c	112,20mm	111,20mm
α	45°	45°

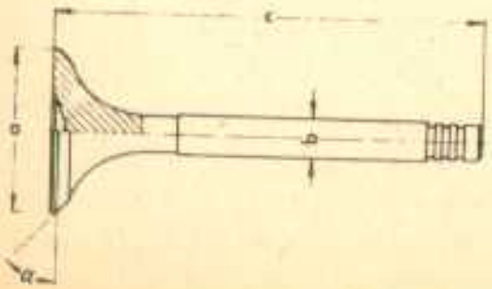
Valve Dimensions 928 S4

Mod. 87 onward

Motortyp M 28.41/42/47

Dim.	Intake	Exhaust
a	37,00mm	33,00mm
b	6,97mm	6,94mm
c	114,70mm	113,70mm
α	45°	45°

Valve Dimensions



Checking and Adjusting Installation Length of Valve Springs (32-valve engines)

Valve springs 85 models onward Engine Type M 28.43/44

Check length of intake-valve and exhaust-valve springs with special tool 9240.

Intake	42,6 + 0,5 mm
Exhaust	41,6 + 0,5 mm

Valve springs 86 models onward Engine Type M 28.45/46

Check length of intake-valve and exhaust-valve springs with special tool 9240/1.

Intake	39,7 + 0,5 mm
Exhaust	38,7 + 0,5 mm

Checking Installation Length of Valve Springs with Depth Gage

Note:
Using a depth gage, measure from surface of valve spring plate through gap to outer spring bearing surface.

Valve spring mod. 85 onward Engine type M 28.43/44

Installation Length

Intake	37,0 + 0,5 mm
Exhaust	36,0 + 0,5 mm

Note:
It is essential to ensure that the correct valve springs are installed in cars of the various model years.

Valve spring mod. 86 onward and engine

Nr. M28.43	81G 00338
Nr. M28.44	81G 05591
Nr. M28.45	89G 00065
Nr. M28.46	89G 05072

Engine type M28.41/42/47

Installation Length

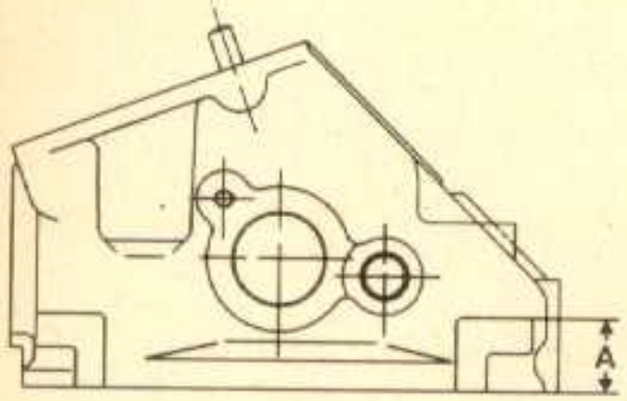
Intake	35,5 + 0,5 mm
Exhaust	34,5 + 0,5 mm

Valve spring	Mod. 85	Mod. 86/87/88/89
Free length Outer spring	40,0 mm	43,5 mm
Wire dia. Outer spring	4,1 mm	3,6 mm
Inner spring	2,9 mm	2,7 mm

Machining Cylinder-Head Mating Face

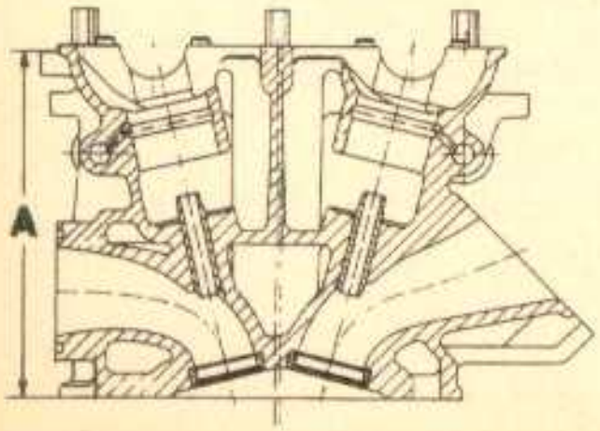
Permissible roughness of mating face: 0,03 mm
Max. depth of material removed: 0,2 mm
peak-to-valley height = 0,015 mm

Motortyp M 28.21/22



Size new A = 24 + 0,1
Size worn A = 23,8

Engine type M 28.43/44/45/46/41/42/47



Size new A = 147 + 0,1
Size wornA = 146,8

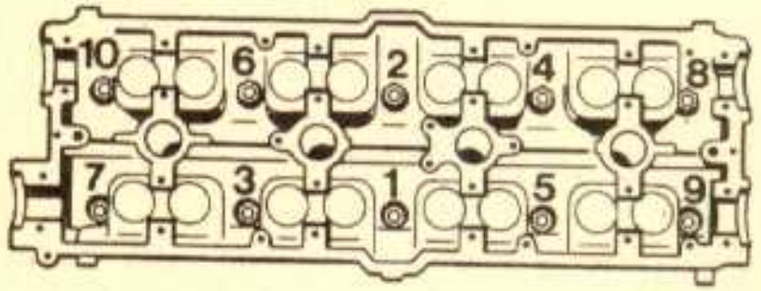
nstalling Cylinder Head (32-valve engines and M 28.21/22)

Cylinder head attached by means of threaded studs

nstalling Cylinder Head

orquing sequence (4 steps)
ee Fig.
equence for removal: reverse

1st step	20 Nm
2nd step	90° of rotation
3rd step	90° of rotation
4th step	90° of rotation



nstalling Cylinder Head (32-valve engines)

exagon cylinder-head bolts

ote
he cylinder head can also be in-
alled with the engine in place.
both cylinder heads are to be
moved and installed, it is advisable
remove the engine first.

rquing sequence (3 steps)
equence for removal: reverse

t step	20 Nm
d step	90° of rotation
d step	90° of rotation

ote
a rule, do not use lubricant when
stalling the cylinder-head nuts or
x bolts and washers.
s only necessary to apply a light
at of engine oil to the stud bolts
hex bolts.

Mod. 89 onward new cylinder head screws
new screw length 20 mm longer
M 12 x 199
M 12 x 149

Camshaft Installation

Model year	Mod. 85/86	Mod. 85/86	Mod. 87	Mod. 88...89
Engine type	**928 S** **M 28.21/22**	**928 S (32-valve eng.)** **M 28.43/44/45/46**	**928 S4** **M 28.41/42**	**928 S4** **M 28.41/42**
Camshaft, right				
Cylinder bank 1...4	928.105.211.00			
Intake shaft		928.105.291.04	928.105.291.09	928.105.271.00
Exhaust shaft		928.105.293.04	928.105.293.09	928.105.273.00
Identification code on	211.00	291.04	291.09	271.00
the rear end face		293.04	293.09	273.00
Camshaft, left				
Cylinder bank 5...8	928.105.212.00			
Intake shaft		928.105.292.04	928.105.292.09	928.105.272.00
Exhaust shaft		928.105.294.02	928.105.294.08	928.105.274.00
Identification code on	212.00	292.04	292.09	272.00
the rear end face		294.02	294.08	274.00
Valve timing,				
1 mm stroke, zero play				
Intake opens	6° CS after TDC	11° CS after TDC	11° CS after TDC	11° CS after TDC
Intake closes	54° CS after BDC	50° CS after BDC	36° CS after BDC	36° CS after BDC
Exhaust opens	43° CS before BDC	30° CS before BDC	17° CS before BDC	17° CS before BDC
Exhaust closes	4° CS before TDC	5° CS before TDC.	2° CS before TDC	2° CS before TDC

Note

The camshafts of 87 und 88...89 models may be combined for installation.

Camshaft Installation Club Sport and GT-Version

Model Year	Mod. 88	Mod.89
Engine Typ	928 S4 M 28.41 Club Sport	928 GT M 28.47
Camshaft right Cylinder bank 1...4 Intake shaft Exhaust shaft	 928.105.291.06 or 928.105.293.06 or	 928.105.271.01 928.105.273.01
Identification code on the rear end face	291.06 293.06	271.01 273.01
Camshaft left Cylinder bank 5...8 Intake shaft Exhaust shaft	 928.105.292.06 or 928.105.294.05 or	 928.105.272.01 928.105.274.01
Identification code on the rear end face	292.06 294.05	272.01 274.01
Valve timing, 1 mm stroke, zero play		
Intake opens Intake closes Exhaust opens Exhaust closes	3° KW after O.T. 42° KW after U.T. 30° KW bef. U.T. 5° KW bef. O.T.	3° KW after O.T. 42° KW after U.T. 30° KW bef. U.T. 5° KW bef. O.T.

Note:

Both types of camshafts may be combined for installation.

Checking Camshaft Settings (32-valve engines)

Model Year Engine Type	Mod. 85/86 M 28.43/44/45/46	From Mod. 87...89 M 28.41/42	From Mod. 88/89 M 28.41 Club Sport M 28.47 (928 GT)
Cylinder bank 1...4 Checking and/or adjustment value	1,6 ± 0,1 mm	1,8 ± 0,1 mm	2,8 ± 0,1 mm
Cylinder bank 5...8 Checking and/or adjustment value	2,0 ± 0,1 mm	2,0 ± 0,1 mm	3,1 ± 0,1 mm

All checking and/or adjustment values are measured at 20° KW after overlapping TDC.

Adjusting Camshaft Toothed Belt

Engine type M 28.21/22
Setting: 4,5

Engine type M 28.43/44/45/46/41/42/47
Setting: 5,0 + 0,3

Drive belt Sizes

Engine type M 28.21/22/43/44/45/46/41/42/47

Drive belts for alternator (Poly-rib)	mm	K6 858 LW
Drive belts for fan and add. air pump	mm	12,5 x 1040 LA-FD shaped teeth
Drive belts for A/C compressor	mm	12,5 x 1125 LA
Drive belts for power steering pump	mm	12,5 x 1000 LA
Drive belts for add. air pump M 28.41/42	mm	12,5 x 925 LA-FD shaped teeth

Checking Belt Tightness

The tightness of all belts is checked by applying thumb pressure to belt at point midway between two pulleys.
Belts must give by approx. 10 mm.

Adjusting Tension of Alternator Poly-Rib Belt

Mod. 85 onward

Settings

New belt:	9,2
Used belt:	8,4 + 0,8

Remark:

The new Poly-rib belts in used '85 models onward have 6 ribs (previously 5).

Coolant Mixing Table
(Average values)

Protection to	Antifreeze	Water	Antifreeze	Water
-25°C	40%	60%	6,4 l	9,6 l
-30°C	45%	55%	7,2 l	8,8 l
-35°C	50%	50%	8,0 l	8,0 l

Cleaning the complete engine-oil system following engine failure (bearing failure)

Note

This cleaning sequence is only intended to given pointers as to where chips may be found. The actual scope of work involved must be determined individually for each engine failure.

Replace the following parts:

- Hydraulic valve tappets
- Chain tensioner
- Oil filter

The following parts must be dismantled, checked and cleaned thoroughly:

- Oil pump
- Thermostat housing
- Bypass valve
- Release valve
- Oil retension valve in the cylinder head

The following parts must be cleaned thoroughly and/or rinsed several times:

Note:

All oil feeder holes may be flushed thoroughly with a commercially available oil – gasoline syringe and benzine.
- Oil sump
- Oil inlet pipe
- Crankcase
- Crankshaft
- Cylinder heads
- Camshaft housing
- Oil lines
- Oil filler pipe
- Oil cooler in the radiator

Change oil filter and engine oil after approx. 500 km running time.

Note:

Following an engine failure, the complete intake system must be checked for foreign bodies and/ or oil and cleaned before assembly.

Testing and Adjusting Specifications

Model year Engine type	Mod. 85/86 M 28.21/22	Mod. 85/86 M 28.43/44/45/46	Mod. 87...89 M 28.41/42	Mod. 89 M 28/47
Test Point	**Specifications**	**Specifications**	**Specifications**	**Specifications**
Electric fuel pump Delivery rate	at least 1350 cm^3/30s	at least 1350 cm^3/30s	at least 1250 cm^3/30s	at least 1250 cm^3/30
Fuel pressure (engine stopped) Fuel pump relay				
bridged	2,5 ± 0,2 bar	2,5 ± 0,2 bar	3,8 ± 0,2 bar	3,8 ± 0,2 bar
Chec value for idle	approx. 2,0 bar	approx. 2,0 bar	approx. 3,3 bar	approx. 3,3 bar
Leak test Min. pressure after 20 Min.	1,0 bar	1,0 bar	3,0 bar	3,0 bar

Idle setting	without cata lytic converter	with	without catalytic converter	with	without catalytic converter	with
Idle speed (rpm)	700 + 50	680 ± 20	675 ± 25[3]	675 ± 25[3]	775 ± 25[3]	775 ± 25[3]
CO level %	0,5...1,5 0,5...1,0 Australia, Switzerland, Sweden	0,6 ± 0,2[1]	0,5...1,5	0,4...1,2[2][3]	0,5...1,5	0,4...1,2[2][3]
HC-levels ppm	≤300	≤300	≤300	≤300	≤300	≤300

[1] Oxygen sensor plug disconnected

[2] Oxygen sensor plug connected

[3] not adjustable

Machining Flywheel

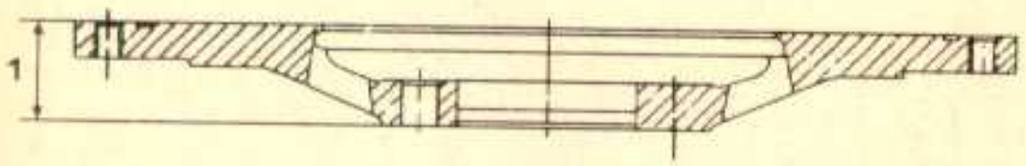
Engine type M 28.21/43/45

The bearing surface for the drive plate on the flywheel can be machined in a lathe when seriously scored or burnt.

The metal removal should be kept as small as possible.
Wear limit 27,5 mm
Max. runout 0,05 mm

Bearing surface machining specifications:
Surface finish + waviness = 0,008 mm

Wear limit 27,5 mm



Torque Specifications for Clutch

Location Nm (kpm)	Description	Thread	Material	Torque
Ring gear - intermediate ring	Bolt	M 7 x 1	8.8	15
Guide tube - clutch/transmission	Bolt	M 6 x 1	8.8	10
Clutch slave cylinder	Bolt	M 8 x 1,25	8.8	23
Clamp/ central shaft I and II	Clamping bolt	M 10 x 1,5	12,9	80
Clutch housing/ central tube	Bolt	M 10 x 1,5	8.8	45
Engine/clutch housing	Bolt	M 12 x 1,5	8.8	85
Clutch housing/ cover	Bolt	M 8 x 1,25	8.8	23
Clutch/ flywheel	Bolt (Socket head bolt)	M 8 x 1,25	8.8	23

Clutch

Engine type M 28.21/43/45

Design	Two plate, dry clutch with pulled version diaphragm springs, located on engine side, hydraulic operation.
Pressure plate	MFZ 200
Contact pressure	5600...6200 N
Clutch disk (flywheel end)	200 Ø
Clutch disk (flywheel end)	200 Ø
Clutch disk lateral runout	0.4 mm at 190 Ø
Clutch play at clutch pedal*	approx. 3 mm

Engine type M 28.41/47

Design	Single-plate dry clutch with diaphragm spring, extended, mounted on engine hydraulic operation
Pressure plate	GMFZ 250
Contact pressure	9900...11100 N
Clutch disk	Ø 250
Nehmerzylinder Kolben	Ø 22,2 mm (before 23,8 mm)

* The clutch play cannot be checked at the clutch pedal because of the automatic hydraulic adjustment.

On the other hand perfect function of the clutch must be guaranteed by having a play of 0.5 mm between the push rod and master cylinder piston.

This play cannot be measured; it must be determined on the clutch pedal by sense of feeling. On the pedal tread plate it will be about 3 mm.

Torque Specifications for Manual Transmission, Gear Shift, Central Tube

Location	Description	Thread	Material	Tightening Torque Nm
Central tube/transmission	Hexagon bolt	M 10 x 1.5	10.9	58
Locknut/ Drive pinion	Locknut	M 32 x 1.5	-	300
Bearing cover/ Transmission case	Hexagon bolt	M 8 x 1.25	10.9	30
Plug/Lock	Screw plug	M 12 x 1.5	5.8	20
Upper cover Transmission case	Hexagon bolt	M 6 x 1	8.8 12.9	10 16
Reverse gear deflector/ upper cover	Hexagon bolt	M 6 x 1	8.8	10
Ring gear bolt	Hexagon bolt	M 12 x 1.25	12.9	165
Side cover/ Transmission case	Hexagon bolt	M 8 x 1.25	8.8	22
Rear cover/ Transmission case	Hexagon bolt	M 8 x 1.25	8.8	22
Oil filler and drain plug	Screw plug	M 24 x 1.5	-	22
Clamping sleeve/ Input shaft	Clamping bolt	M 10 x 1,5	12.9	80
Backup light switch	Backup light switch	M 18 x 1,5	-	22
Joing flange/output Transmission	Hexagon bolt	M 10 x 1,5	8.8	43
Bearing unit/inner shift rod	Conical bolt	M 8 x 1,25	8.8	15
Transmission mount/ Transmission case	Hexagon bolt	M 12 x 1,5	8.8	85
Central tube/ Clutch housing	Hexagon bolt	M 10 x 1,5	8.8	43
Shift rod/Bearing unit (Shift rod clutch)	Hexagon bolt	M 8 x 1,25	-	25
Angle joint/ Guide tube	Hexagon nut	BM 10	-	25
Bearing bracket for guide tube to body or central tube	Hexagon nut	M 6 x 1	-	10
Cap and Hexagon nut on stud for preselector spring	Cap and Hexagon nut	M 14 x 1	-	50

5-Speed-Manual Transmission Type G 28

Type	Equipment	installed in:	Model Year
G 28/10	5 speed	928 S Eur./R.o.W.	1985/86
G 28/11	5 speed	928 S USA	1985/86
G 28/12	5 speed	928 S4 Eur./R.o.W.	1987/88
G 28/13	5 speed	928 S4 USA/Japan	1987/88
G 28/55*	5 speed	928 S4 Club Sport ww	1988
		928 GT ww	1989

*limited slip differential fitted as standard (40%)

5-Speed-Manual Transmission Type G 28

General Data	Manual Transmission Typ G 28.10/12/55					Manual Transmission Typ G 28.11/13				
Design	Direct transmission with layshaft									
Ratios*	Z_1	Z_2	i_z $Z_2:Z_1$	ilay 32:22	$i_z \times i_{lay}$	Z_1	Z_2	i_z $Z_2:Z_1$	i_{lay} 33:21	$i_z \times i_{lay}$
1. gear	17	44	2,5882	1,4545	3,7645	17	44	2,5882	1,5714	4,0672
2. gear	22	38	1,7272	1,4545	2,5122	22	38	1,7272	1,5714	2,7142
3. gear	26	32	1,2307	1,4545	1,7900	26	32	1,2307	1,5714	1,9339
4. gear	29	27	0,9310	1,4545	1,3541	29	27	0,9310	1,5714	1,4629
5. gear	direct		1,0000	direct	1,0000	direct		1,0000	direct	1,0000
R.-gear	22 (30)	(30) 50	2,2727	1,4545	3,3056	22 (30)	(30) 50	2,2727	1,5714	3,5714

Final drive	Drive pinion without hypoid displacement	
Final drive ratio	11:30 i = 2,7272 (G 28.10/55) 11:29 i = 2,6363 (G 28/12)	15:33 i = 2,200
Transmission oil	Multi-grade gear lube SAE 75 W 90 API-classification GL 5 (or MIL-L 2105 B)	
Oil capacities	85 models and earlier = approx. 3,8 liters 86 models onward = approx. 4,5 Liter	

Z_1 = Number of teeth on first gear wheel in the load path of the gear concerned

Z_2 = Number of teeth on second gear wheel in the load path of the gear concerned

i_z = Gear ratio

i_{Vor} = Layshaft ratio

Torque Specifications for Automatic Transmission

Location	Description	Thread	Material	Tightening torque (Nm)
Primary pump to front cover	Bolt	M 8	8.8	20
Screw plug (Converter)	Bolt	M 10 x 1	10.9	14
Front cover to transmission case	Bolt	M 8	8.8	13
Support flange to transmission case	Bolt	M 6	10.9	11
Screw plug (Brakeband B 1)	Screw plug	M 27 x 1,5	-	70
Catch plate to range selector shaft	Bolt	M 6	8.8	8
Leaf spring to transmission case	Hexagon bolt	M 6	8.8	8
Anti-restart and backup light switch to transmission case	Bolt	M 6	8.8	8
Range selector lever to shaft	Hexagon bolt	M 6	8.8	8
Secondary pump to transmission case	Hexagon bolt	M 6	8.8	8
Nut, shaft axial mounting, governor	Hexagon nut	M 6	8	6

Torque Specifications for Automatic Transmission

Location	Description	Thread	Material	Tightening torque (Nm)
Lower cover with reinforcement plate	Socket head bolt	M 5	5.8	4
Lower cover, assembly to transmission case	Bolt	M 6	8.8	8
Screw plug (Test point modulating, governor, operating pressure)	Screw plug	M 8 x 1		13
Bolt (Bracket vacuum socket)	Bolt	M 6	8.8	8
Kick-down solenoid valve	Solenoid valve	M 14 x 1,5		20
End cover to valve body	Socket head bolt	M 4	8.8	3,3
End plate to pick-up case	Socket head bolt	M 4	8.8	3,3
Pick-up case to valve body	Socket head bolt	M 5	4.8	0,15
Valve body to transmission	Bolt	M 6	8.8	8
ATF filter to lower cover	Bolt	M 5	8.8	4

Torque Specifications for Automatic Transmission

Location	Description	Thread	Material	Tightening torque (Nm)
Screw plug (ATF pan)	Screw plug	M 10 x 1	-	14
ATF pan to transmission case	Hexagon bolt	M 8	8.8	8
Front converter housing to transmission case	Socket head bolt	M 8	8.8	23
Driver plate to converter	Hexagon bolt	M 8	-	46
Rear converter housing to transmission case	Socket head bolt	M 10	8.8	42
Bearing unit to rear transmission case	Socket head bolt	M 8	10.9	33
Final drive to transmission case	Hexagon bolt	M 10	8.8	46
	Hexagon nut	M 10	8	46
Collar nut (Drive pinion)	Collar nut	M 26 x 1,5	-	380
ATF filler tube to ATF pan	Coupling nut	M 24	-	78
ATF tank to ATF pan	Socket head bolt	M 6	8.8	6

4-Speed-Automatic Transmission A 28

Type	Equipment	installed in	Model Year
A 28/04	4 speed	928 S USA/Japan	1985
A 28/05	4 speed	928 S Europe/R.o.W. rear axle transm. ratio 14:33	1985
A 28/06	4 speed	928 S Europe/R.o.W. rear axle transm. ratio 13:33	1985
A 28/07	4 speed	928 S USA/Japan	1986
A 28/08	4 speed	928 S Europe/R.o.W. rear axle transm. ratio 14:33	1986
A 28/09	4 speed	928 S Europe/R.o.W. rear axle transm. ratio 13:33	1986
A 28/11	4 speed	928 S Australia, M-298/299	1986
A 28/12	4 speed	928 S4 USA	1987/88
A 28/14	4 speed	928 S4 Europe/R.o.W.	1987/88
A 28/16	4 speed	928 S4 worldwide	1989

4-Speed-Automatic Transmission A 28

General Data	A 28.04/07/12	A 28.05/06/08/09/11/14/16
Design	Fully automatic 4-speed sun-and-planet transmission	
Ratios	**A 28.04/05/06/07/08/09/11/12/14**	**A 28.16**
1st gear	3,6760	3,87
2nd gear	2,4120	2,25
3rd gear	1,4360	1,44
4th gear	1,0000	1,00
Reverse gear	5,1390	5,59
Final drive	Drive pinion without hypoid displacement	
Final drive ratio	15 : 33 i = 2,200	14 : 33 i = 2,357 **(A28.05/08)** 13 : 33 i = 2,538 **(A 28.06/09/11/14/16)**
Stall speed	**A 28.04/07** = 1650...2050 1/min	**A 28.05/06/08/09/11** = 2200...2600 1/min
	A 28.12 = 1750...2150 1/min	**A 28.14/16** = 1750...2150 1/min
Capacity, rear axle final drive	approx. 2,7 l ('87 models onward, approx. 3,0 l hypoid transmission oil.) API classification GL5 (MIL - L 2105 B) SAE 90	
Cpacity, autom. unit with converter	Total capacity = approx. 8,0 l ('87 models onward, approx. 9,3 l). Capacity for fluid change with converter = approx. 6,0 l ('87 models onward, approx. 7,3 l) ATF - Dexron II D	

Pressure Values in Bar until Model '86

Test pressure	Transm. Type A 28.04/07	Transm. Type A 28.05/06/08/09/11	Measuring instructions	
Modulating pressure*	4,4 + 0,05	4,0 + 0,05	ATF temp. approx. 80°C, Selector lever in pos. „D", driving speed approx. 140 km/h, vacuum line disconnected at modulating pressure cell.	
Operating pressure	16,9 + 1	15,3 + 1	ATF temp. approx. 80°C, Selector lever in pos. „D", engine running at idle speed, vacuum line disconnected at modulating pressure cell.	
Governor pressure	approx. 0,2 approx. 1,1 approx. 2,0 approx. 2,7	approx. 0,2 approx. 1,1 approx. 2,0 approx. 1,7	at 20 km/h at 50 km/h at 100 km/h at 150 km/h	Selector lever in pos. „D", vehicle rolls in partial load range, vacuum line disconnected at modulating pressure cell.

*** Note**

If local constraints preclude testing the car at approx. 140 km/h (88 mph), measurements may be carried out at approx. 50 km/h (31 mph).

Pressure Values in Bar, '87 Models Onward

Test pressure	Transmission Type A 28.12/14/16		Measuring instructions	
Modulating pressure*	4,2 + 0,05		ATF temp. approx. 80°C, Selector lever in pos. „D", driving speed approx. 140 km/h, vacuum line disconnected at modulating pressure cell.	
Operating pressure	16,0 + 1		ATF temp. approx. 80° C Selector lever on D, engine running at 1400 rpm, parking brake engaged and foot brake actuated. Max. test duration 5 sec. vacuum hose disconnected at modulator unit.	
Governor pressure	**A 28.14/16**	**A 28.12**		
	approx. 0,2	0,17	at 20 km/h	Selector lever in pos. „D", vehicle rolls in partial load range, vacuum line disconnected at modulating pressure cell.
	approx. 1,1	0,96	at 50 km/h	
	approx. 2,0	1,74	at 100 km/h	
	approx. 2,7	2,35	at 150 km/h	

*Note
If local constraints preclude testing the car at approx. 140 km/h (88 mph), measurements may be carried out at approx. 50 km/h (31 mph).
As both versions use different final drive ratios, governor pressures differ for USA/R.o.W. versions. The USA governor rotates slower at given driving speed.
Standardized transmission used worldwide from 1989 model year.

Gear Shift Points in km/h

	Transmission Type A 28.04/07/12		Transmission Type A 28.05/08	
Accelerator pedal position	km/h	km/h	km/h	km/h
Selector lever position	△	▽	△	▽
Full throttle "D" 1-2-1	58...64	28...24	54...59	26...22
Full throttle "D" 2-3-2	109...125	54...47	102...117	50...44
Full throttle "D" 3-4-3	190...211	131...115	177...197	122...107
Full throttle "2" 1-2	58...64	-	approx. 63	-
Kick-down "D" 1-2-1	62...68	45...39	58...63	42...36
Kick-down "D" 2-3-2	126...143	122...106	118...133	144...99
Kick-down "D" 3-4-3	207...216	203...183	193...213	189...171
Kick-down "2" 1-2	69...75	-	approx. 68	-

	Transmission Type A 28.06/09/11/14		Transmission Type A 28.16	
Accelerator pedal position	km/h	km/h	km/h	km/h
Selector lever position	△	▽	△	▽
Full throttle "D" 1-2-1	50...55	24...21	41...50	30...23
Full throttle "D" 2-3-2	95...109	47...41	102...117	49...43
Full throttle "D" 3-4-3	165...183	114...100	169...188	144...128
Full throttle "2" 1-2	50...55	-	53...58	-
Kick-down "D" 1-2-1	54...59	39...34	59...61	48...43
Kick-down "D" 2-3-2	109...112	106...92	123...125	120...105
Kick-down "D" 3-4-3	180...188	176...159	192...195	186...167
Kick-down "2" 1-2	60...65	-	59...61	-

Note: All speed specifications are approximate values.

Key to symbols: △ Shift up
▽ Shift down

Torque Specifications for Front Axle

Location	Description	Thread	Material	Tightening torque Nm
Top of control arm to body	Self locking hexagon nut	M 14 x 1,5	8.0	140
Bottom of control arm to body at rear	Hexagon bolt	M 12 x 1,5	10.9	120
Bottom of control arm to body at front	Hexagon bolt	M 12 x 1,5	8.8	85
Support bar to chassis member	Self locking hexagon nut	M 10	8.0	46
Spring strut to body	Self locking hexagon nut	M 10	8.0	46
Spring strut and hanger to bottom control arm	Self locking hexagon nut	M 12 x 1,5	8.0	85
Stabilizer clip to chassis member	Hexagon bolt	M 10	8.8	46
Stabilizer hanger to Stabilizer	Self locking hexagon nut	M 12 x 1,5	8.0	85
Top and bottom control arm to steering knuckle	Locknut	M 12 x 1,5	8	65
Guard to steering knuckle	Hexagon bolt	M 7	8.8	15
	Hexagon bolt	M 7	8.8	15
Brake caliper to steering knuckle	Hexagon bolt or Socket head screw	M 12 x 1,5	8.8	85
Brake disk to wheel hub	Countersunk bolt	M 6	8.8	10
Socket head screw to clamping nut	Socket head screw	M 7	10,9	15
Wheel to wheel hub	Wheel nut	M 14 x 1,5	Al	130
Track rod to steering arm	Self locking hexagon nut	M 12 x 1,5	8	65
Rubber mount on piston rod of spring strut	Self locking hexagon nut	M 12 x 1,5	8	60
Ball joint to bottom control arm	Self locking hexagon nut	M 12 x 1,5	10	120
Support plate on link pin (upper control arm)	Self locking hexagon nut	M 12 x 1,5	8	85
Speed sensor to steering knuckle	Socket head screw	M 6	8.8	10

Torque Specifications for Steering

Location	Description	Thread	Material	Tightening torque Nm
Steering gear to engine mount	Self locking hexagon nut	M 10	5	46
Track rod to steering arm	Self locking hexagon nut	M 12 x 1,5	8	65
Universal joint to steering gear	Self locking hexagon nut	M 8	8	28
Track rod to ball joint	Hexagon nut	M 14 x 1,5	04	45
Tie rod to steering rack	Tie rod	M 16 x 1,5	16 MnCr 5	150
Universal joints to steering shaft and idler arm	Self locking hexagon nut	M 8	8	28
Delivery and return line to steering gear	Hollow bolt	M 14 x 1,5		30
Steering wheel to steering shaft	Hexagon nut	M 18 x 1,5	8	50
Stabilizer clip to chassis member	Hexagon bolt	M 10	8.8	46
V-belt pulley to power steering pump	Self locking hexagon nut	M 14 x 1,5	8	50
Steering guard to body	Socket head bolt	M 6 with 4 mm socket		9,7
		M 6 with 5 mm socket		12
Hose nipple of intake hose to power steering pump	Hollow bolt	M 18 x 1,5	C 35	60

Torque Specifications for Rear Axle

Location	Description	Thread	Material	Tightening torque Nm
Cross member to body	Hexagon bolt	M 10	8.8	46
Light alloy casting (suspension link bearing) for lower control arm 86 mod. onward) to body	Hexagon bolt	M 10		46
Lower control arm to cross member (camber eccentric)	Locknut	M 14 x 1.5	10	200
Lower control arm to body (track eccentric)	Locknut	M 12 x 1,5	10	120
Brake caliper to wheel carrier	Hexagon bolt	M 12 x 1,5	8.8	85
Wheel member to lower control arm	Locknut	M 14 x 1,5	8	140
Upper control arm to cross member, upper control arm to wheel member	Locknut	M 10	8	46
Drive shaft and rear wheel shaft to wheel hub	Locknut	M 22 x 1,5	8	460
Drive shaft to transmission and input shaft	Socket head bolt	M 10	12.9	81
Wheel to wheel hub	Wheel nut	M 14 x 1,5	A1	130
Spring strut to body	Locknut	M 10	8	46
Stabilizer mount to body	Hexagon bolt	M 10	8.8	46
Stabilizer hanger to lower control arm	Hexagon bolt	M 10	8.8	46
Stabilizer housing to Stabilizer	Locknut	M 10	8	46

Torque Specifications for Rear Axle

Location	Description	Thread	Material	Tightening torque Nm
Rocker arm to lower control arm	Locknut	M 12 x 1,5	8	85
Rubber mount to piston rod (spring strut)	Locknut	M 12 x 1,5	8	58
Transmission mount to rear axle cross member	Hexagon bolt	M 12 x 1,5	8.8	85
Speed sensor to wheel member	Socket head bolt	M 6	8.8	10
Bracket to wheel member	Hexagon bolt	M 6	8.8	10
Bracket to cross member	Lcoknut	M 6		6
Guard to wheel member	Locknut	M 8	8	23
	Hexagon bolt	M 6	8.8	10

Technical Data - Front Axle, Steering and Rear Axle

Front Axle

Wheel suspension	Independent suspension, double control arm with coil spring and internal damper
Springs	1 coil spring per wheel
Dampers	Double-action dampers
Stabilizers	Ø 28 x 4 mm (tubular stabilizer)

Steering

	Rack and pinion power steering with tie rods
Steering wheelØ	380 mm
Steering wheel ratio (in center position)	17,75:1
Turning circleØ	11,5 m
Track circleØ	9,6 m
No. of steering wheel turns from lock to lock	3,13

Rear Axle

Wheel suspension	Independent wheel suspension with lower diagonal suspension links and upper wishbones, coil springs and internal dampers
Springs	1 coil spring per wheel
Dampers	Double-action hydraulic dampers
Stabilizer	Ø 22,5 x 3,5 mm (tubular stabilizer)

Wheel Alignment Adjusting Values*

The following values apply to curbweight according to DIN 70020 (car with full fuel tank, spare wheel and tools)

	Adjusting Value and Tolerance	Max. Difference Left to Right
Front Axle		
Height setting: From the contact surface to measuring point on rear link bearing	190 - 20 mm**	10 mm
Toe-in unpressed	+ 15'+5'	
Track difference at20° lock	-1° +20'	may only be affected by replacing steering arms
Camber	-30'+10'	10'
Caster	3°30'+30'	20'
Rear Axle		
Height setting: From tire contact surface to measuring point on cross member	173 + 10 mm**	10 mm
Toe-in per wheel	+10'+5'	10'
Camber	-40'+10'	10'

* The vehicle alignment settings are applicable to the actual vehicle ride height only (see repair manual pp. 44-1 etc.)

** The height setting values apply to new vehicles. Used vehicles may be up to 10 mm lower, i.e. the tolerance may deviate by minus 10mm. This must, however, be the same for both axles.

Coil Springs for Adjustable Spring Struts (Front Axle)

Note

The coil springs have been grouped into tolerance classes and are color-coded accordingly.

Coil Spring Part No. 928 343 511 06 (green)

Used in 928 S pressureless Boge dampers (standard dampers) until end of model year 85
or 928 S (sport dampers)

Group	Color Code	Spring force F where length L1 =191 mm	Ordering index	Free length (new springs)
1	1 x green	6377 - 6573 N	201	approx. 350 mm
2	2 x green	6574 - 6769 N	202	approx. 350 mm
3	3 x green	6770 - 6965 N	203	approx. 350 mm

Coil Spring Part No. 928 343 511 09 (brown)

Used in: 928 S with Boge gas-pressure dampers standard and optional extra (sport) '86 models onward

Group	Color code	Spring force F where length L1 =191 mm	Ordering index	Free length (new springs)
1	1 x brown	6375 - 6570 N	401	approx. 340 mm
2	2 x brown	6571 - 6766 N	402	approx. 340 mm
3	3 x brown	6767 - 6963 N	403	approx. 340 mm

Torque Specifications for Mechanical Brake System

Location	Description	Thread	Material	Tightening torque Nm
Socket head screw to clamping nut	Socket head screw	M 7	10.9	15
Brake caliper to steering knuckle	Hexagon bolt/ cap screw	M 12 x 1,5	8.8	85
Brake caliper to wheel carrier	Hexagon bolt/ cap screw	M 12 x 1,5	8.8	85
Floating caliper housing (floating caliper) to bracket	Guide pin	M 9		15 - 20
Brake disk to wheel hub	Counter sunk screw	M 6	8.8	10
Guard to steering knuckle	Hexagon bolt	M 7	8.8	15
Locking segment for handbrake to bearing bracket	Hexagon bolt	M 8	8.8	25
Drive shaft or rear wheel shaft to wheel hub	Locknut	M 22 x 1,5	8	460
Wheel to wheel hub	Wheel nut	M 14 x 1,5	Al	130
Locking segment to handbrake lever	Locknut	M 8	8	23
Guard to wheel member	Locknut	M 8	8	23
	Hexagon bolt	M 6	8.8	10
Speed sensor to wheel member and steering knuckle	Socket head screw	M 6	8.8	10

Torque Specifications for Hydraulic Brake System

Location	Description	Thread	Tightening torque Nm
Brake booster to face wall	Hexagon nut	M 8	23
Brake line to master brake cylinder, brake hoses , brake pressure regulator, T-distributor and hydraulic unit Connecting line to four-piston fixed caliper	Coupling nut	M 10 x 1	12
Brake hose to floating frame caliper	Brake hose	M 10 x 1	1
Brake hose to floating caliper	Brake hose	M 10 x 1	14
Brake hose to floating and four-piston fixed caliper	Hollow bolt	M 10 x 1	16,5
Brake hose, rear, to four-piston fixed caliper	Brake hose	M 10 x 1	14
Locknut to push rod (brake booster)	Hexagon nut	M 10	35

Location	Description	Thread	Tightening Torque Nm
Bleed Screw to floating frame and floating caliper	Bleed screw	M 7	3,5 bis 5,0
Bleed screw to four-piston fixed caliper	Bleed screw	M 10	8 - 12
Master brake cylinder to vacuum booster	Hexagon nut	M 8	23
Stoplight switch to master brake cylinder	Stoplight switch	M 10 x 1 short taper	15 + 4
Brake pressure regulator to wheel well	Hexagon nut	M 8	23
Screw-in regulator to master brake cylinder or hydraulic unit	Screw-in regulator	M 10 x 1	14
Hydraulic unit bracket to wheel well	Hexagon nut	M 8	23
Hydraulic unit to hydraulic unit bracket	Hexagon nut	M 6	10
T-distributor to bracket	Hexagon nut	M 6	10
Housing (floating caliper) to bracket	Guide pin	M 9	15 - 20

Technische Daten - Bremsanlage

Description		Mod. 85, Remarks/ Specifications	86 mod. onward Remarks/Specific.	Wear limit
Brake booster Ø		10 inches	10 inches	
	iv	3,8 (internal ratio)	4,5 (internal ratio)	
			87 models onward, pedal free travel is shorter	
Brake master cylinder Ø			Tandem cylinder with 2 central valves	
	front	23,81 mm	23,81 mm	
	rear	19,05 mm	20,64 mm	
Brake pressure regulator (screw-in regulator)				
Switching pressure		33 bar	18 bar	
Reduction factor		0,46	0,46	
Brake disc Ø	front	282 mm	304 mm	
	rear	289 mm	299 mm	
Eff. brake disc Ø	front	228 mm	250,8 mm	
	rear	242 mm	246 mm	
Piston Ø in caliper	front	54 mm	86 models each fixed caliper 2 x 42 + 2 x 36 mm	
			87* models onward each fixed caliper 2 x 44 + 2 x 36 mm	
	rear	36 mm	each fixed caliper 2 x 30 + 2 x 28 mm	
Pad surface per front wheel		100 cm^2	126 cm^2	
Pad surface per rear wheel		63 cm^2	86 cm^2	
Total pad surface		326 cm^2	424 cm^2	
Pad thickness	front	13 mm	13 mm	2 mm
	rear	13 mm	13 mm	2 mm

Technical Data - Braking System

Description	Mod. 85 Specifications/ Remarks	from Mod. 86 Specifications/ Remarks	Wear Limit
New brake disc thickness			
front	32 mm	32 mm	
rear	20 mm	24 mm	
Brake discs - Min. thickness**			
after machining front	31,2 mm	30,6 mm	30.6/30 mm
rear	19.2 mm	22.6 mm	18.6/22 mm
Thickness tolerance for brake disc max.	0.02 mm	0.02 mm	
Lateral runout for brake discs max.	0.05 mm	0.05 mm	
Lateral runout for installed brake discs max.	0.1 mm	0.1 mm	
Max. surface finish after machining	0.006 mm	0.006 mm	
Play on brake pedal with brakes bled and engine stopped (footbrake arm without stop)	approx. 10 mm determined by permanently set clearance at points inside braking unit	approx. 10 mm determined by permanently set clearance at points inside braking unit	
Parking brake *** (handbrake)	Drum brake applied mechanically on both rear wheels	Drum brake applied mechanically on both rear wheels	
Parking brake drum dia.	180 mm	180 mm	181 mm
Brake shoe width	25 mm	25 mm	
Brake liner surface area per wheel	85 cm2	85 cm2	
Brake liner thicknesss	4.5 mm	4.5 mm	2 mm

* Fixed calipers with pistons of dia. 42/36 mm were installed in some cars (USA, Canada, Australia and Arabian countries) in the 1987 model year.
The front-axle brake calipers with 44/36 mm dia. pistons can be retrofitted in 86 models only in pairs.

** Brake disks may only be machined symmetrically, i.e. evenly on both sides.

*** 87 models onward, parking brake liners made of asbestos-free material (Energit 559). The liners can be retrofitted to vehicles earlier than model year 87 (right-hand and left-hand sides).

Rims, Tires and Tire Pressure

Standard tires			Tires	Rims	ET**
85/86 model	928 S	front	225/50 VR 16	7 J x 16 H 2	65
		rear	225/50 VR 16	7 J x 16 H 2	65
87 mod. onward	928 S4	front	225/50 VR 16	7 J x 16 H 2	65
		rear	245/45 VR 16	8 J x 16 H 2	52.3
	928 S4 Club Sport	front	225/50 VR 16	8 J x 16 H 2	60
		rear	245/45 VR 16 (with 17 mm washer)	9 J x 16 H 2	60
89 mod. onward	928 GT	front	225/50 ZR 16*	8 J x 16 H 2	60
		rear	245/45 ZR 16* (with 17 mm washer)	9 J x 16 H 2	60

* "ZR" 89 model onward
"VR" above 210 km/h, "ZR" above 240 km/h

** rim offset in mm

Tire Pressure in bar (Summer Tires)

Type	928 S	928 S4	928 S4 Club Sport 928 GT
Front axle	2.5 bar	2.5 bar	2.5 bar
Rear Axle	3.0 bar	3.0 bar	3.0 bar

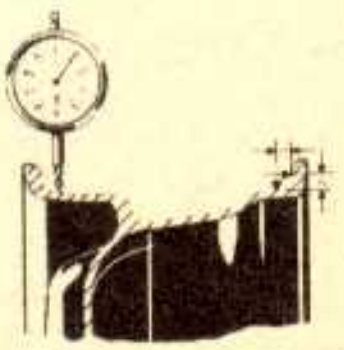
Collapsible spare tire until 85 models 2.2 bar, 86 models onward 2.5 bar
Winter tires front 2.5 bar, rear 3.0 bar

Checking wheel Rims

Refer to drawing for radial and lateral runout measuring points on inner and outer rim shoulders.

Max. permissible radial and lateral runout for light alloy rims = 1.0 mm.

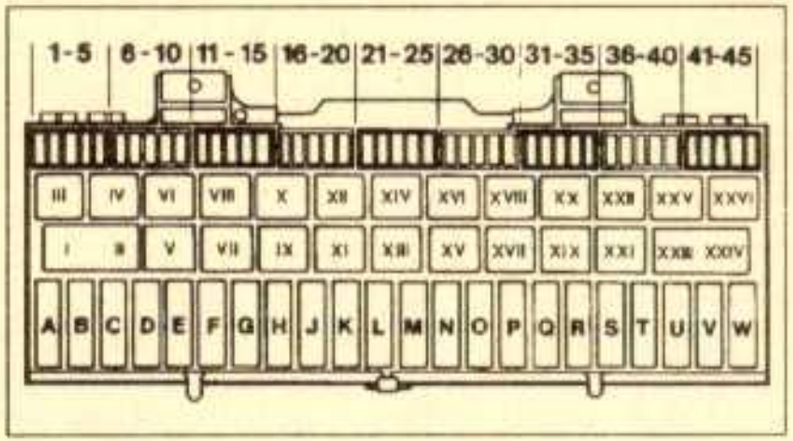
Note:
Never straighten distorted wheel rims



Location of Fuses and Relays

The central electric board is accessible after folding up a cover in footwell of passenger's side. It holds 45 fuses and 26 relais. The fuses are grouped into 5 blocks comprising 5 fuses each and are no longer numbered. To check a special fuse it is necessary to count from left to right.

All wire harness plug connections for the central electric board are located below the relays and marked with letters A through W. The connectors have been fitted with coding elements to avoid confusion.



Note:

The seat belt timer relay is located in the center console ahead of the radio, the rear window wiper relay behind the tool plate at rear left, the bulb controller in the passenger-side oddments tray.

Fuses Model 85

No.	Amp.	
1	5	Central lock system
2	20	Cigar lighter
3	-	-
4	7,5	Stop light, tempostat
5	15	Windshield wipers
6	5	Light: Button panel, light switch
7	15	Seat heater
8	7,5	Air conditioner
9	-	-
10	5	Instruments, indicator lamps
11	7,5	Rear window wiper
12	7,5	Backup lights, mirror control
13	15	Additional air conditioner
14	25	Sun roof
15	30	Window controls

16	10	ABS
17	30	Fresh air blower
18	15	Two-tone horn
19	25	Rear window defogger
20	30	Power seat left
21	30	Power seat right
22	-	-
23	7,5	Afterrunning radiator fan
24	5	Inside lights
25	20	Headlight cleaner
26	1	Tailgate unlocking
27	15	Concealed headlight motor
28	15	Booster
29	25	Radiator fan
30	15	Fog light

No.	Amp.	
31	7,5	High beam left
32	7,5	High beam right
33	15	Additional high beam
34	5	Turn signal front left
35	5	Turn signal rear left
36	5	Turn signal front right
37	5	Turn signal rear right
38	7,5	Low beam left
39	7,5	Low beam right
40	5	Side marker light left
41	5	Side marker light right
42	15	Fuel pump, auxiliary air valve
43	5	License plate light, engine compartment light
44	5	Lights: Ashtray, instruments
45	5	Rear fog lights

Relays

I + II	-	Rear window defogger
III	-	-
IV	-	X-Relay
V	-	Turn signal flasher relay
VI	-	Window controls
VII	-	Wiper intermittent action
VIII	-	Defroster
IX	-	Extensive cleaning
X	-	Fresh air blower
XI	-	Surpressor
XII	-	Two-tone horn
XIII	-	Fog light
XIV	-	Starter
XV	-	Kick down (only automatic)
XVI	-	EZF
XVII	-	ABS
XVIII	-	Auxiliary fan
XIX	-	Headlight cleaner
XX	-	Fuel pump
XXI	-	-
XXII	-	Backup light (bridge at manual transmission)
XXIII + XXIV	-	Light
XXV	-	LH-Jetronic
XXVI	-	-

Fuses Model 86

No.	Amp.	
1	5	Central lock system
2	25	Cigar lighter
3	-	-
4	7,5	Stop light, tempostat
5	15	Windshield wipers
6	5	Light: Button panel, light switch
7	15	Seat heater
8	7,5	Air conditioner
9	-	-
10	5	Instruments, indicator lamps
11	7,5	Rear window wiper
12	7,5	Backup lights, mirror control
13	15	Additional air conditioner
14	25	Sun roof
15	30	Window controls
16	15	ABS
17	30	Fresh air blower
18	15	Two-tone horn
19	25	Rear window defogger
20	30	Power seat left
21	30	Power seat right
22	-	-
23	7,5	Afterrunning radiator fan
24	5	Inside lights
25	25	Headlight cleaner
26	1	Tailgate unlocking
27	15	Concealed headligh* motor
28	15	Booster
29	25	Radiator fan
30	15	Fog light

No.	Amp.	
31	7,5	High beam left
32	7,5	High beam right
33	15	Additional high beam
34	5	Turn signal front left
35	5	Turn signal rear left
36	5	Turn signal front right
37	5	Turn signal rear right
38	7,5	Low beam left
39	7,5	Low beam right
40	5	Side marker light left
41	5	Side marker light right
42	15	Fuel pump, auxiliary air valve
43	5	License plate light, engine compartment light
44	5	Lights: Ashtray, instruments
45	5	Rear fog lights

Relays

I + II	-	Rear window defogger
III	-	-
IV	-	X-Relay
V	-	Turn signal flasher relay
VI	-	Window controls
VII	-	Wiper intermittent action
VIII	-	Defroster
IX	-	Extensive cleaning
X	-	Fresh air blower
XI	-	Surpressor
XII	-	Two-tone horn
XIII	-	Fog light
XIV	-	Starter
XV	-	Kick down (only automatic)
XVI	-	EZF
XVII	-	ABS
XVIII	-	Auxiliary fan
XIX	-	Headlight cleaner
XX	-	Fuel pump
XXI	-	Inside light
XXII	-	Backup light (bridge at manual transmission)
XXIII + XXIV	-	Light
XXV	-	LH-Jetronic
XXVI	-	-

Fuses Model 87/88

No.	Amp.	
1	5	Central lock system
2	25	Cigar lighter
3	5	Control unit fan
4	7,5	Stop light, tempostat
5	25	Windshield wipers, heated spray jet
6	7,5	Air conditioner
7	5	Light: Button panel, light switch, diagnosis connection
8	15	Seat heater
9	-	-
10	5	Instruments, indicator lamps, solenoid valve Kick down
11	7,5	Rear window wiper
12	7,5	Backup lights, mirror control
13	15	Additional air conditioner
14	25	Sun roof
15	30	Window controls
16	15	ABS
17	30	Fresh air blower
18	15	Two-tone horn
19	25	Rear window defogger
20	30	Power seat left
21	30	Power seat right
22	15	Booster
23	7,5	Fresh air flap motor
24	7,5	Inside lights, diagnosis connection
25	25	Headlight cleaner
26	1	Tailgate unlocking
27	15	Concealed headlight motor
28	30	Radiator fan 1
29	30	Radiator fan 2
30	15	Fog light

No.	Amp.	
31	7,5	High beam left
32	7,5	High beam right
33	15	Additional high beam
34	5	Turn signal front left
35	5	Turn signal rear left
36	5	Turn signal front right
37	5	Turn signal rear right
38	7,5	Low beam left
39	7,5	Low beam right
40	5	Side marker light left
41	5	Side marker light right
42	15	Fuel pump, heater, Oxygen sensor
43	5	License plate light, engine compartment light
44	5	Lights: Ashtray, instruments
45	5	Rear fog lights

Relay

I + II	-	Rear window defogger
III	-	-
IV	-	X-Relay
V	-	Turn signal flasher relay
VI	-	Window controls
VII	-	Wiper intermittent action
VII	-	Defroster
IX	-	Extensive cleaning
X	-	Fresh air blower
XI	-	Surpressor
XII	-	Two-tone horn
XIII	-	Fog light
XIV	-	Starter
XV	-	Kick down (only automatic)
XVI	-	EZK
XVII	-	ABS
XVIII	-	Flap control
XIX	-	Headlight cleaner
XX	-	Fuel pump
XXI	-	Inside light
XXII	-	Backup light (bridge at manual transmission)
XXIII + XXIV	-	Light
XXV	-	LH-Jetronic
XXVI	-	-

Fuses Model 89

No.	Amp.	
1	15	Central lock system
2	25	Cigar lighter
3	5	Control unit fan
4	7,5	Stop light, tempostat
5	25	Windshield wipers, heated spray jet
6	7,5	Air conditioner
7	5	Light: Button panel, light switch, diagnosis connection
8	15	Seat heater
9	7,5	Telephone
10	5	Instruments, indicator lamps, solenoid valve Kick down
11	7,5	Rear window wiper
12	7,5	Backup lights, mirror control, tire pressure control
13	15	Additional air conditioner
14	25	Sun roof
15	30	Window controls
16	15	ABS
17	30	Fresh air blower
18	15	Two-tone horn
19	25	Rear window defogger
20	30	Power seat left
21	30	Power seat right
22	15	Booster
23	7,5	Fresh air flap motor
24	7,5	Inside lights, diagnosis connection, combi
25	25	Headlight cleaner
26	1	Tailgate unlocking
27	15	Concealed headlight motor
28	30	Radiator fan 1
29	30	Radiator fan 2
30	15	Fog light

No.	Amp.	
31	7,5	High beam left
32	7,5	High beam right
33	15	Additional high beam
34	5	Turn signal front left
35	5	Turn signal rear left
36	5	Turn signal front right
37	5	Turn signal rear right
38	7,5	Low beam left
39	7,5	Low beam right
40	5	Side marker light left
41	5	Side marker light right
42	15	Fuel pump, heater, Oxygen sensor
43	5	License plate light, engine compartment light
44	5	Lights: Ashtray, instruments
45	5	Rear fog light

Relays

I + II	-	Rear window defogger
III	-	-
IV	-	X-Relay
V	-	Turn signal flasher relay
VI	-	Window controls
VII	-	Wiper intermittent action
VIII	-	Defroster
IX	-	Extensive cleaning
X	-	Fresh air blower
XI	-	Surpressor
XII	-	Two-tone horn
XIII	-	Fog light
XIV	-	Starter
XV	-	Kick down (only automatic)
XVI	-	EZK
XVII	-	ABS
XVIII	-	Flap control
XIX	-	Headlight cleaner
XX	-	Fuel pump
XXI	-	Inside light
XXII	-	Backup light (bridge at manual transmission)
XXIII + XXIV	-	Light
XXV	-	LH-Jetronic
XXVI	-	-

Technical Data of Air Conditioner

Refrigerant volume with add. air conditioner	1050 g of refrigerant R 12 1200 g of refrigerant R 12	950 g as from July 88 1150 g as from July 88
Refrigerating oil in compressor	280 ± 20 cm^3 Densoil 6	
Safety valve on fluid tank	Safety valve opens at pressure of 40 ± 5 bar.	
Power input of Compressor clutch	approx. 45 W at 12 V	

Torque Specifications – Air Conditioner

Location	Description	Thread	Tightening torque
Compressor–Suction line	Coupling nut	7/8" x 14 UNF	33 Nm
Compressor–Pressure line	Coupling nut	3/4" x 16 UNF	24 Nm
Condenser-inlet	Coupling nut	3/4" x 16 UNF	24 Nm
Condenser–Fluid tank	Coupling nut	3/4" x 16 UNF	24 Nm
Fluid tank-evaporator	Coupling nut	5/8" x 18 UNF	17 Nm
Expansion valve–Pressure line	Coupling bolt	5/8" x 18 UNF	17 Nm
Expansion valve–Suction line	Coupling bolt	7/8" x 18 NS	33 Nm
Expansion valve-evaporator	Coupling bolt	3/4" x 18 NS	24 Nm

Dimensions

Type Model Year		928 S 85/86	928 S4 87	928 S4 (Club Sport) 88	928 S4/928 GT 89
Wheelbase	mm/in	2500/98.43	2500/98.43	2500/98.43	2500/98.43
Track width, front	mm/in	1549/61.00	1551/61.06	1551/61.06 1561/61.46*	1551/61.06 1561/61.46**
Track width, rear	mm/in	1521/59.80	1546/60.90	1548/60.90 1565/61.61*	1546/60.90 1565/61.61**
Length	mm/in	4447/175.08 (4462/175.67)	4520/177.95 (4523/178.07)	4520/177.95 (4523/178.07)	4520/177.95 (4523/178.07)
Width	mm/in	1836/72.28	1836/72.28	1836/72.28	1836/72.28
Height (acc. DINcurb- weight)	mm/in	1282/50.47	1282/50.47	1282/50.47	1282/50.47
Ground clearance	mm/in	120/4.72	120/4.72	120/4.72	120/4.72
Turning circle	m/ft	app. 11.5/37.73	app. 11.5/37.73	app. 11.5/37.73	app. 11.7/38.4

Overhang angle at permissible total weight				
front	15° 22° without front spoiler	15,2°	14,0°	14,0°
rear	19,6°	14,1°	14,5°	14,5°

(USA values in brackets)

* Club Sport ** 928 GT

Performance Data (acc. Din curbweight and half vehicle capacity weight)

Type		928 S		928 S		928 S4	
Model Year		85		86		87/88	
		Manual transm.	Automatic transm.	Manual transm.	Automatic transm.	Manual transm.	Automatic transm.
Max. speed	km/h	255 (250)	250 (242)	255 (250)	250 (242)	270 (265)	265 (260)
	mph	155 (155)	150 (152)	158 (155)	155 (150)	168 (165)	165 (162)
Acceleration 0...100 km/h	6,2	6,7	6,2	6,7 (6,3)	5,9 (6,8)	6,3 (6,0)	(6,6)
Kilometer from standing start	s	25,6 (25,8)	26,3 (26,8)	25,6 (25,8)	26,3 (26,8)	25,4 (25,4)	25,9 (26,2)
1/4 mile from standing start	s	(14,2)	(14,9)	(14,2)	(14,9)	14,2 (14,1)	14,5 (14,7)

Type		928 S4	928 GT	928 S4
Model Year		89		89
		Manual transm.		Automatic transm.
Max. speed	km/h	270	275	265
	mph	168	171	165
Acceleration 0...100 km/h	s	5,9	5,8	6,3
Kilometer from standing start	s	25,4	25,2	25,9
1/4 mile from standing start	s	14,2	14,1	14,5

(USA values in brackets)

Weights

Type Model Year	928 85/86		928 S4 87		928 S4/928 GT 88/89	
	Europe, R.o.W.	USA	Europe, R.o.W.	USA	Europe, R.o.W.	USA
Curbweight to DIN*	kg 1530	kg/lbs 1520/3351	kg 1580	kg/lbs 1590/3505	kg 1580	kg/lbs 1590/3505
Perm. total weight	kg 1890	kg/lbs 1870/4123	kg 1920	kg/lbs 1920/4233	kg 1920	kg/lbs 1900/4189
Perm. axial laod front**	kg 920	kg/lbs 900/1984	kg 920	kg/lbs 920/2028	kg 920	kg/lbs 920/2028
Perm. axial load rear**	kg 1100	kg/lbs 1000/2205	kg 1100	kg/lbs 1100/2425	kg 1100	kg/lbs 1100/2425
Perm. trailer load unbraked***	kg 750		kg 750		kg 750	
Perm. trailer load brakedt***	kg 1600		kg 1600		kg 1600	
Perm. roof load** with Porsche roof transport system from Mod. 82	kg 35 kg 75	kg/lbs 35/77 kg/lbs 75/165	kg 35 kg 75	kg/lbs 35/77 kg/lbs 75/165	kg 35 kg 75	kg/lbs 35/77 kg/lbs 75/165
Perm. drawbar	kg 75		kg 75		kg 75	
Perm. towing weight	kg 3490		kg 3520		kg 3520	

* With extra equipment up to 1550 kg or 1560 for USA models (the vehicle capacity weight is reduced correspondingly). From Model 87 up to 1600 kg or 1610 kg.
** The permissible total weight must not be exceeded.
*** Up to 16 % incline

Filling Capacities

Engine oil specification	permissible: API SE/SF mit Kombination API SE/CC - SE/CD - SF/CC - SF/CD Multi-grade oil as approved by plant Technical Information Engine Oils
Engine oil volume	Approx. 7.5 ltr., plus 0.5 ltr. when replacing filter (exact amount depending on marks on oil dipstick). Amount of oil between "Min."- und "Max."- marks on oil dipstick = approx. 1.5 l.
Cooling system incl. heater	Approx. 16 ltr. of coolant, plant filling with anti-freeze for temperatures to –30°C (–40°C for arctic countries). Only use anti-freeze and corrosion inhibiting products, which are suitable for light alloy engines and radiators.
Power steering	Approx. 0,7 ltr. ATF (only Dexron II D)
Fuel tank	Approx. 86 ltr., 8 ltr. of which as reserve
Brake fluid reservoir	Approx. 0.2 ltr. brake fluid in accordance with SAE J 1703 or DOT 3
Windshield washer with headlamp washer system	Approx. 9.0 ltr. water, from model 86 approx. 7.5 ltr. water
Intensive cleaning system	Approx. 0.6 ltr. "Porsche Special Silicone Remover"
Manual transmission with differential	Multi-grade transmission oil SAE 75 W 90 API-classification GL 5 (or MIL-L 2105 B) Filling capacity until modell 85 approx. 3,8 l (from model 86 approx. 4,5 l)
Automatic transmission with converter	Filling capacity approx. 8,0 l (from model 87 approx. 9,3 l) Oil change capacity with converter approx. 6.0 ltr. (from model 87 approx. 7.3 ltr.) ATF-Dexron II D
Rear axle drive	Filling capacity ca. 2,7 l (from model 87 approx. 3,0 l) API-classification GL 5 (MIL-L 2105 B) SAE 90