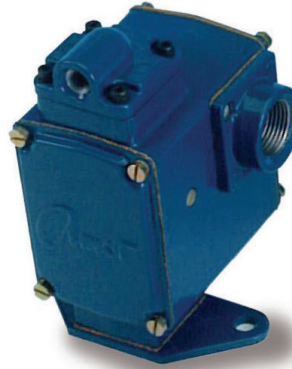


Pressure and Temperature Switches

Model 4140

Typical applications

- Suitable for industrial and marine applications
- Providing protection and safety of:
 - Diesel engines
 - Compressors
 - Pumps
 - Transmissions
 - Gearboxes



**Model 4140C & 4140F
Pressure Switch**



**Model 4140D & 4140E
Temperature Switch**

Key features and benefits

- Gold and silver plated contacts - for use in I/S circuits
- Weatherproof enclosure IP56
- Single and dual set points - alarm and shutdown capabilities in one unit
- Combined temperature and pressure with independent, fully adjustable set points - for use in diverse applications

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Pressure and Temperature Switches - Model 4140

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WARNING

A Warning indicates a hazardous situation that, if not avoided, could result in death or serious injury to personnel. The text of the warning describes the hazard and details of the precautions that must be applied before the step of the procedure is carried out.

CAUTION

A Caution indicates a hazardous situation that, if not avoided, could result in minor or moderate injury. The text of the caution describes the hazard and details of the precautions that must be applied before the step of the procedure is carried out.

NOTICE

A Notice contains supplementary information that may be useful to the operator and may appear before or after a particular step in the procedure.

Pressure and Temperature Switches - Model 4140

Overview

AMOT type 4140 switches are available as a single (4140C & F), dual step pressure or temperature switch (4140D & E), or a combined pressure and temperature switch (4140A).

4140 temperature switches and combined switches are supplied with a thermal well or slip coupling and are mounted by inserting the temperature sensing element into a properly located pipe boss.

Installation and Operation

Mechanical

For all versions, care should be taken to position the switch so that access to both front and rear switch covers is afforded. Removal of the front cover allows access for adjustment of the temperature and pressure settings.

Removal of the rear cover (nearest the conduit connection bonnet), allows access to the microswitch terminal connection.

4140A/D/E

Versions with a temperature switch (4140A, 4140D and 4140E) are mounted by inserting the temperature sensing element directly in to a pipe boss or similar. The mounting thread is defined by the model code.

No attempt should be made to remove the coupling from the unit. For a switch with a slip coupling, ensure that the fluid seal nut is tightened after proper positioning of the temperature sensing element to prevent leakage of the sensed fluid.

The switch must be located so that the temperature sensing element is well into the fluid stream - this is particularly so for oils and other viscous fluids. Avoid installing the switch in a large 'T' or at the end of a piping manifold which has little or no circulation. It is important to keep the temperature sensing element out of air pockets.

NOTICE

When the thermal wells are supplied separately it is necessary to use heat transfer compound, part no. 40081, to reduce temperature lag.

When the slip coupling is required, it is supplied fitted to the temperature switch. Designed for direct connection to pipework, it allows rotation of the temperature switch for best installation position and immersion level adjustment of the temperature sensing element.

CAUTION

For combined pressure and temperature switches: Ensure the temperature sensed fluid does not cause pressure diaphragm to exceed 90°C (194°F), as this could result in damage to diaphragm, switch failure, and fluid leakage.

4140A/C/F

Versions with a pressure switch (4140A, 4140C and 4140F) are fitted with a flange which can be mounted to any convenient surface. The pressure input is then connected to a threaded inlet on a pressure bonnet, with either 1/8" BSP (Tr) or 1/8" NPT thread, which is defined by the model code.

Either rigid or flexible tubing can be used for connections to the bonnet, although flexible tubing is preferable. When sensing viscous fluid a minimal internal tube diameter of 3/16" (4.8 mm) is recommended. Do not permit swarf, dirty or any other abrasive material to enter the pressure bonnet as this will cause damage to the diaphragm. Tubing should be thoroughly cleaned internally before connecting to the bonnet.

Do not overtighten the tube fitting into the pressure bonnet. An orifice, 1/32" diameter (0.8 mm) is incorporated in the pressure bonnet to dampen out pulsations present in fuel oil pressure lines etc. circulating by positive displacement pumps. In systems having extreme pressure pulsations, it may be necessary to include a secondary orifice.

CAUTION

Sensed pressure fluid temperature must not exceed 90°C (194°F).

Pressure and Temperature Switches - Model 4140

Installation and Operation Continued

Electrical

- 1) Electrical connection is made directly to the microswitches within the housing of the 4140 product.
- 2) Remove the cover which is nearest to the cable entry conduit.

NOTICE

The 4 screws which hold the covers on are captive, and do not need to be removed from the cover.

- 3) Fit a suitable cable gland to the side of the 4140 product, ensuring that it meets or exceeds the required IP rating, and that it is sized correctly to match the cable to be used.

WARNING

Where a voltage in excess of 50V ac or 75V dc is to be connected, the product MUST be earthed.

- 4) Prepare the end of the cable by removing the outer sheath, taking care not to cut in to the insulation of any of the individual wires.
- 5) Refer to the wiring information on the label, located on the inside of the cover. For two step switches, this shows which switch operates first, and for all versions it shows which terminals of the microswitch are open or closed contacts below or above set point.

- 6) Ensure that the prepared wires are long enough to reach the required terminals, with a small amount of slack, without being excessively long.
- 7) Although bare wires may be connected to the screws on the microswitches, it is preferable to terminate each wire with a ring crimp.
- 8) Ensure that all microswitch screws are tight, and that there are no stray strands of wire which are not firmly clamped.
- 9) Re-fit the cover.

CAUTION

Ensure that the current rating of the microswitch is not exceeded. Refer the Specification section for microswitches specifications.

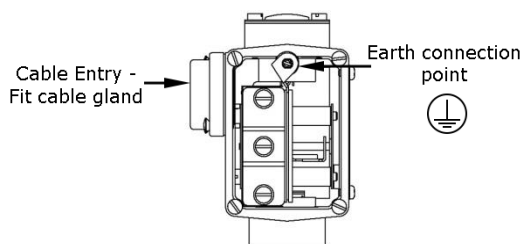


Figure 1: Parts location for wiring

Marine Classification Information

In accordance with the Classification Societies rules a thermowell must be used on all temperature switch installations for liquid sensing, in marine applications. The following have been Type Approved by Germanischer Lloyd for marine applications:

- Pressure ranges
 - 1, 2, 3, 4 and 9
- Temperature ranges
 - 1, 2, 3, 4 and 5
- Microswitch types
 - H, K, R and S

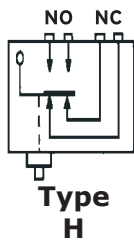
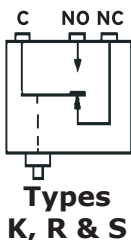
Please contact AMOT Customer Services or Quality Department for types with GL Approval.

Pressure and Temperature Switches - Model 4140

Switch Characteristics

Microswitch

Terminations: Terminal connection details are specified on the inside of the terminal cover plate next to the microswitch fitting. All microswitch types have common, normally open and normally closed screw terminal markings and can be wired to provide make or break action on rising or falling setpoints.



Current rating: The table below details maximum current rating (AMPS) for the standard K microswitch. For details of other rating of alternative switch types, consult AMOT.

Maximum current rating for Microswitch K				
Voltage	AC		DC	
	Resistive	Inductive	Resistive	Inductive
8	-	-	15	15
14	-	-	15	10
30	-	-	6	5
125	15	15	0.4	0.05
230	-	-	0.2	0.03
250	15	15	-	-
277	15	15	-	-
460	15	15	-	-

Pressure (Bar)

Switch type	Code	Pressure range				Switch pressure differential				Pressure differential		Sensed pressure max.
		Falling		Rising		Switch 1		Switch 2		Switch 2 above Switch 1		
		Min	Max	Min	Max	Diff	Tol +/-	Diff	Tol +/-	Min	Max	
K	1	0.28	3.45	0.48	3.72	0.24	0.10	0.41	0.21	0.34	1.03	24
	2	3.45	6.89	3.66	8.34	0.31	0.10	0.55	0.28	0.69	1.38	24
	3	6.89	20.68	8.27	23.44	2.07	1.03	3.10	1.03	1.38	2.07	40
	4	8.96	34.47	12.41	40.00	4.48	1.38	6.89	2.07	4.14	6.21	40
	9	0.10	1.52	0.14	1.65	0.08	0.03	0.17	0.08	0.28	0.69	10
H, R, S	1	0.34	3.45	0.90	4.27	0.67	0.21	1.24	0.62	1.03	2.41	24
	2	2.76	7.45	3.38	9.37	0.93	0.31	1.86	0.90	2.07	2.76	24
	3	6.20	18.27	9.30	24.13	4.48	1.38	5.51	2.76	2.76	4.83	40
	4	8.96	29.65	15.86	40.00	8.62	1.72	10.34	2.76	4.14	6.21	40
	9	0.17	1.52	0.38	1.86	0.25	0.08	0.50	0.25	0.34	1.03	10

Pressure (PSI)

Switch type	Code	Pressure range				Switch pressure differential				Pressure differential		Sensed pressure max.
		Falling		Rising		Switch 1		Switch 2		Switch 2 above Switch 1		
		Min	Max	Min	Max	Diff	Tol +/-	Diff	Tol +/-	Min	Max	
K	1	4	50	7	54	3.5	1.5	6	3	5	15	348
	2	50	100	53	121	4.5	1.5	8	4	10	20	348
	3	100	300	120	340	30	15	45	15	20	30	580
	4	130	500	180	580	65	20	100	30	60	90	580
	9	1.5	22	2	24	1.2	0.4	2.5	1.2	4	10	145
H, R, S	1	5	50	13	62	10	3	18	9	15	35	348
	2	40	108	49	136	13	4.5	27	13	30	40	348
	3	90	265	135	350	65	20	80	40	40	70	580
	4	130	430	230	580	125	25	150	40	60	90	580
	9	2.5	22	5.5	27	3.6	1.2	7.3	3.6	5	15	145

Pressure and Temperature Switches - Model 4140

Switch Characteristics Continued

Temperature stem adaptors

Code	Temperature stem adaptor	Plating	Max. pressure - bar (psi)	Comments
A	No adaptor fitted/pressure switch	Zinc plate	-	
B	Slip coupling ½" BSP (PL)	Zinc plate	17.5 (254)	
C	Slip coupling ½" NPT	Aluminum bronze	17.5 (254)	
E	Thermowell ½" BSP (PL)	Aluminum bronze	105 (1,523)	
G	Thermowell ¾" BSP (PL)	Aluminum bronze	105 (1,523)	
H	Thermowell ¾" BSP (PL)	Stainless steel	207 (3,002)	
K	Thermowell ½" BSP(PL)	Aluminum bronze	69 (1,001)	Temp range 6 ONLY
L	Thermowell ½" NPT	Aluminum bronze	69 (1,001)	
M	Thermowell ½" NPT	Aluminum bronze	105 (1,523)	

Temperature ranges

Switch type	Code	Temperature range		Temperature differential				Max. cont. temperature	
		Rising		Switch 1		Switch 2		°C	°F
		°C	°F	°C	°F	°C	°F		
H, K, R, S	0	Pressure switch							
K	1	16 - 54	61 - 129	3.5 ± 1.5	6.3 ± 2.7	3.5 ± 1.5	6.3 ± 2.7	88	190
	2	49 - 71	120 - 160	2.5 ± 1	4.5 ± 1.8	3 ± 1.5	5.4 ± 2.7	93	199
	3	66 - 87	151 - 189	3 ± 1.5	5.4 ± 2.7	3 ± 2	6.3 ± 3.6	102	216
	4	83 - 104	181 - 219	4 ± 2	7.2 ± 3.6	4.5 ± 2	8.1 ± 3.6	110	230
	5	99 - 123	210 - 253	6.5 ± 3	11.7 ± 5.4	6.5 ± 3	11.7 ± 5.4	128	262
	6	120 - 250	248 - 482	15 ± 3	27 ± 5.4	21 MIN	38 MIN	280	536
H, R, S	1	16 - 54	61 - 129	6 ± 2.5	10.8 ± 4.5	7 ± 2.5	12.6 ± 4.5	88	190
	2	49 - 71	120 - 160	4.5 ± 1.5	8.1 ± 2.7	5.5 ± 1.5	9.9 ± 2.7	93	199
	3	66 - 87	151 - 189	5 ± 2	9 ± 3.6	6.5 ± 2	11.7 ± 3.6	102	216
	4	83 - 104	181 - 219	6 ± 2	10.8 ± 3.6	6.5 ± 3	11.7 ± 5.4	110	230
	5	99 - 123	210 - 253	9.5 ± 3	17.1 ± 5.4	12 ± 2	21.6 ± 3.6	128	262

Pressure and Temperature Switches - Model 4140

How to Order

Use the table below to select the unique specification of your Model 4140 Pressure/Temperature Switch.

Example	4140A	K	1	A	1	1	C	B	3	-EE	Code description	Comments
Model (A)												
Model (A)	4140A										Pressure/temperature	
	4140C										Single step pressure	
	4140D										Single step temperature	
	4140E										Dual step temperature	
	4140F										Dual step pressure	
Microswitch type (B)												
Microswitch type (B)	H										Double break	
	K										Low reset differential 4G at 100 Hz	
	R										High vibration/shock resistant 14G at 100 Hz	
	S											Gold plate contacts
Finish (C)												
Finish (C)		1									Standard	
		3									Corrosion protected	
Conduit thread (D)												
Conduit thread (D)			A								No bonnet fitted	Standard or corrosion protected finish
			C								1/2" NPT	Standard finish
			E								PG 13.5	
			H								M20x1.5	
			V								PG 9	
			M								1/2" NPT	Corrosion protected finish
			P								PG 13.5	
			S								M20x1.5	
		W								PG 9		
Pressure connection (E)												
Pressure connection (E)			0								Temperature switch	
			1								1/8" BSP (Tr)	Standard finish
			2								1/8" NPT	
			3								1/8" BSP (PL)	
			4								1/8" BSP (Tr)	Corrosion protected finish
			5								1/8" NPT	
		6								1/8" BSP (PL)		
Pressure range (F)												
Pressure range (F)			0								Temperature switch	
			*								For pressure ranges available, refer to the pressure ranges tables on page 5.	
Temperature stem length (G)												
Temperature stem length (G)				A							Pressure switch	
				C							80 mm	
				E							40 mm	
Temperature stem adaptor (H)												
Temperature stem adaptor (H)				A							Pressure switch	
				**							For temperature stem adaptors available, refer to the temperature stem adaptors table on page 6.	
Temperature range (J)												
Temperature range (J)									0		Pressure switch	
									***		For temperature ranges available, refer to the temperature ranges table on page 6.	
Special requirements (K)												
Special requirements (K)										-EE	Standard	
										-***	Made-to-order	

NOTES:

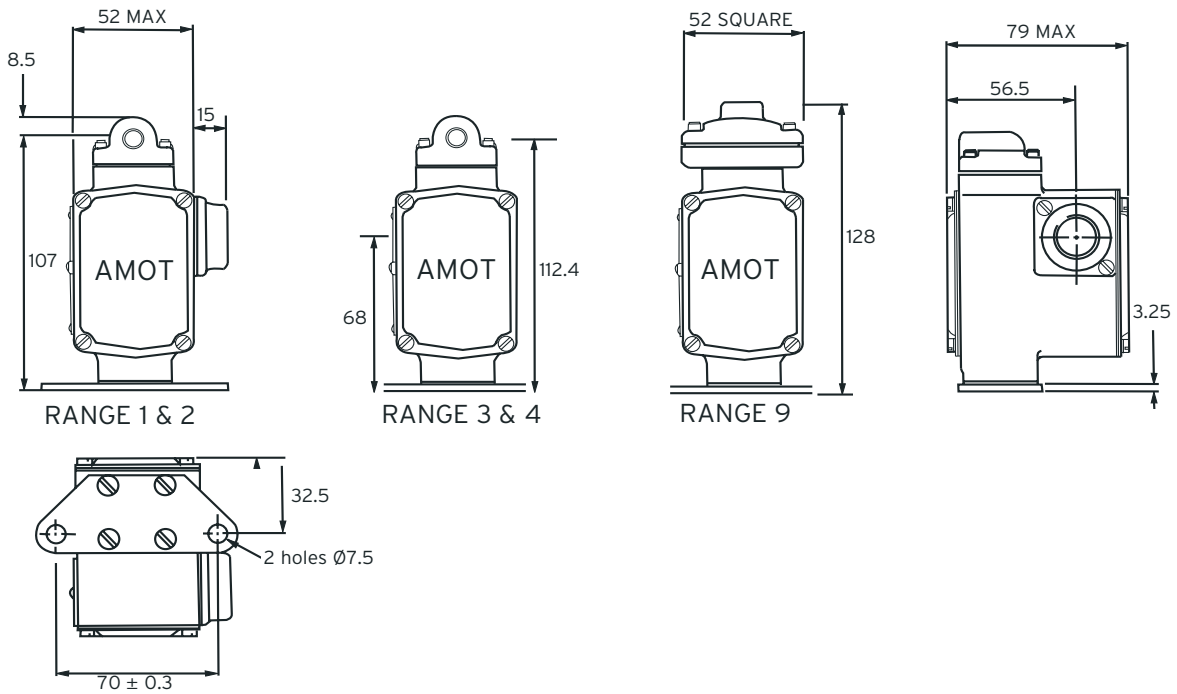
If any of the codes in your AMOT pressure/temperature switch part number do not correspond with the given values above, please contact the facility to confirm your AMOT pressure/temperature switch part number.

Pressure and Temperature Switches - Model 4140

Dimensions

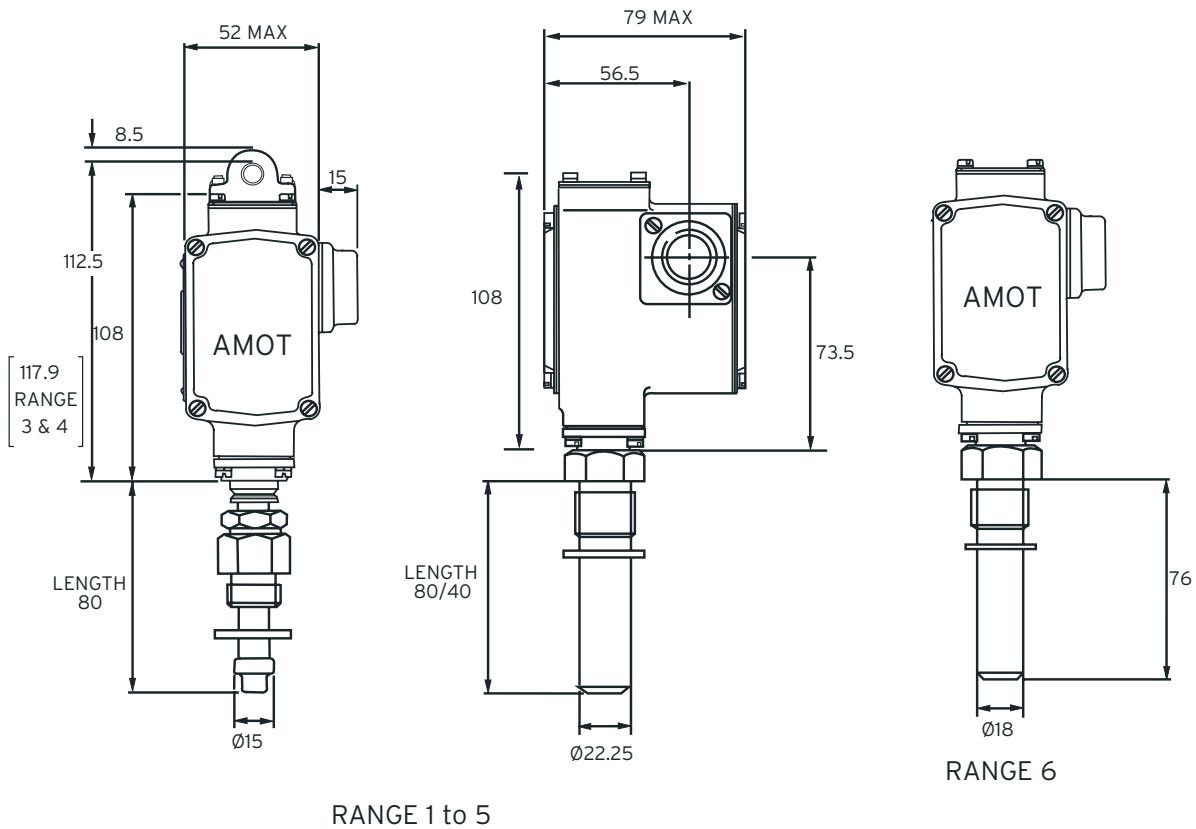
Pressure switches - 4140A/C/F

Dimensions - mm



Temperature switches - 4140A/D/E

Dimensions - mm



Pressure and Temperature Switches - Model 4140

Specification

	Metric units	English units
Housing materials	Diecast aluminum alloy casting; fully gasketed and weatherproof	
Finish	Epoxy polyester powder coating	
Pressure sensing wetted parts	Fitted with nitrile rubber diaphragm	
Temperature sensing probe	Wax element enclosed in copper sheath or bi-metallic disc (range 6)	
Vibrations	Microswitch type K	4G at 100Hz
	Microswitch types H, R & S	14G at 100hz
Temperature (ambient)	Temperature switch	-40°C - 120°C -40°F - 248°F
	Pressure switch	-40°C - 90°C -40°F - 194°F
Types	Single	
	Dual	
	Combined pressure and temperature	
Set point adjustment	Fully adjustable upon opening the housing	
Set point indication	Clear visibility on scale plate	
Microswitch terminals	Screw terminals; Common, normally open and normally closed connections. Easily wired for rising or falling set points.	
Microswitch current	H, K, R & S	15A resistive at 15VDC
		0.5A resistive at 250VDC
	R & S ONLY	15A resistive at 125VAC
		15A resistive at 250VAC
Cable entry	Side fitments PG 13.5 thread standard	
Pressure sensing	0.28 - 40 bar	4 - 580 psi
Temperature sensing	16°C - 250°C	60°F - 482°F

Maintenance and Service Parts

Over time, exposure to foreign chemicals and particulate matter as well as prolonged operation at extreme conditions may reduce the effectiveness of the pressure/temperature switch. At such time, AMOT Pressure and Temperature Switches can be restored to original performance simply by installing an AMOT Pressure and Temperature Switches service kit. Service kits include all new microswitch, seals and seal components required for normal maintenance.

There is no requirement for periodic maintenance of any versions of the product. However, if the equipment to which they are attached has a maintenance schedule, the correct operation of the product should be checked at that time.

AMOT designs and tests all its products to ensure that high quality standards are met. For good product life, carefully follow AMOT's installation and maintenance instructions; failure to do so could result in damage to the equipment being protected or controlled.

Pressure and Temperature Switches - Model 4140

Maintenance and Service Parts Continued

How to order service kits

Service kits are available with microswitch assembly, seals and seal components required for normal maintenance. Order service kits using the service kit model number which is identified by the microswitch type, pressure range and finish, and temperature connection.

Refer to the AMOT switch part number that is printed on the switch nameplate and the AMOT switch part number structure on page 7.

Please quote the switch model and serial number in full, together with the service kit model number required when ordering service kits.

Service kit model number structure

Use the table below to select the unique specification of your Model 4140 Pressure and Temperature Switch Service Kit.

Example	44046L	1	1	0	Code description	Comments
					Basic model number (A)	
Basic model number (A)	44046L				Service kit for 4140A ONLY	
	44047L				Service kit for 4140C ONLY	
	44048L				Service kit for 4140D ONLY	
	44049L				Service kit for 4140E ONLY	
	44050L				Service kit for 4140F ONLY	
					Microswitch type (B)¹	
Microswitch type (B)¹		2			H	Refer to Microswitch type (B) in How to order table on page 7.
		4			K	
		7			R	
		8			S	
					Pressure range and finish (C)	
Pressure range and finish (C)			0		Temperature version	Model (A) = 4140D, 4140E
			1		Range 1	Standard finish
			2		Range 2	
			3		Range 3	
			4		Range 4	
			5		Range 1	Corrosion protected finish
			6		Range 2	
			7		Range 3	
			8		Range 4	
			9		Range 9	Standard or corrosion protected finish
					Temperature connection (D)	
Temperature connection (D)			0		Pressure version	
			1		½" BSP or NPT	
			2		¾" BSP or NPT	
			3		High temperature	Temperature range (J) = 6
			4		M20x1.5 mm	

NOTES:

¹ If your microswitch type code does not correspond with the given values, please contact the facility to confirm your microswitch type code.

Pressure and Temperature Switches - Model 4140

Maintenance and Service Parts Continued

Service parts

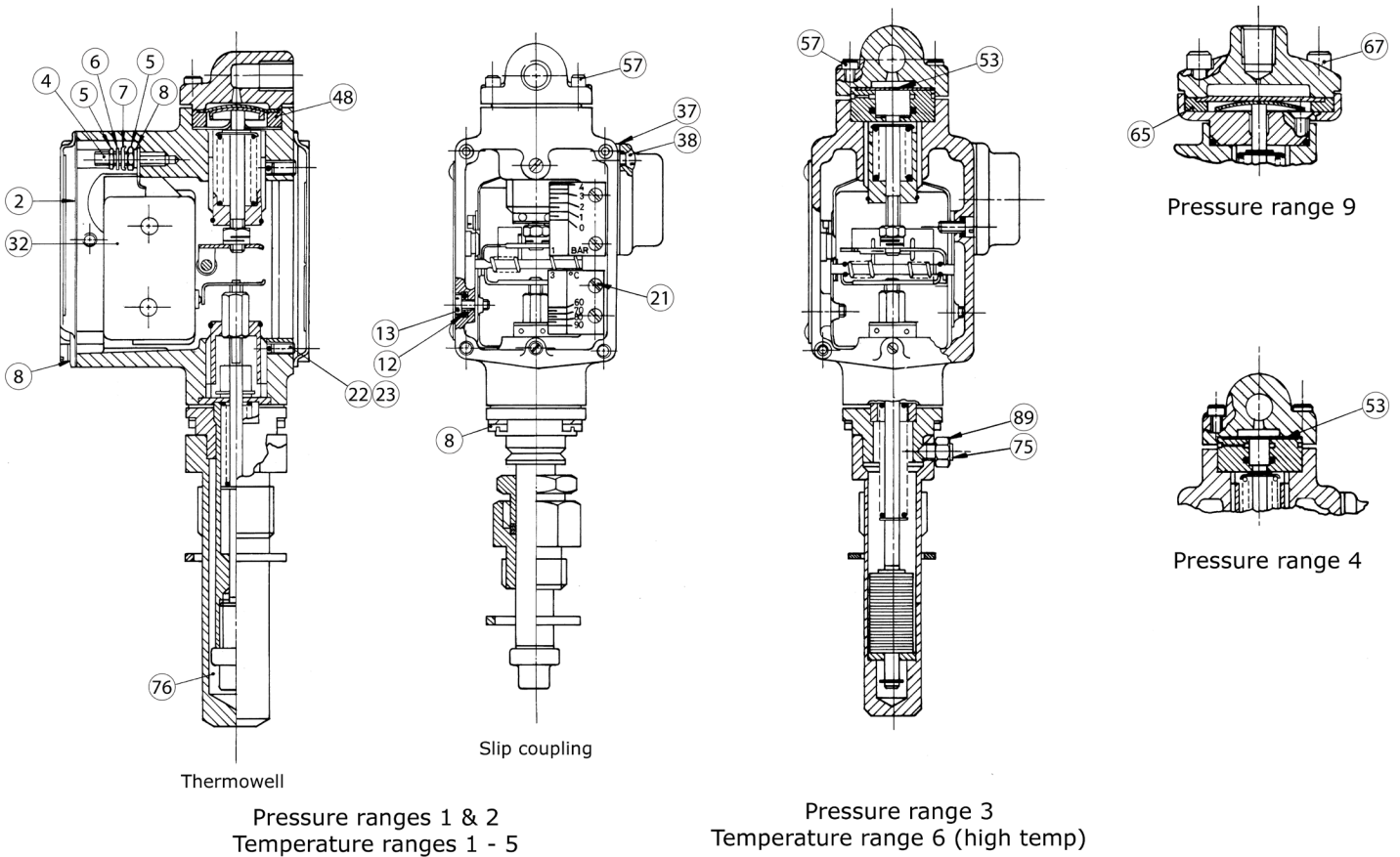
Service kit parts					
Ref no.	Qty.			Description	Switch part number code restrictions
	44046L(---)	44047L(---) & 44050L(---)	44048L(---) & 44049L(---)		
2	2	2	2	Gasket housing cover	NONE
4	1	1	1	Screw	NONE
5	2	2	2	Locknut	NONE
6	1	1	1	Washer, shakeproof	NONE
7	1	1	1	Washer, cup, terminal	NONE
8	3	3	3	Washer, spring	NONE
12	2	2	2	Seal	NONE
13	2	2	2	Screw	NONE
21	2	2	2	Screw	NONE
22	1	1	1	Nylon ball	NONE
23	1	1	1	Screw, grub	NONE
32	1	1	1	Microswitch assembly	NONE
37	1	1	1	Gasket, conduit bonnet	Conduit thread (D) = C, E, H, M, P, S
38	2	2	2	Screw	
48	1	1	-	Diaphragm assembly	Pressure range (F) = 1, 2
53	1	1	-	Diaphragm assembly	Pressure range (F) = 3, 4
57	4	4	-	Screw	Pressure range (F) = 1, 2, 3, 4
65	1	1	-	Diaphragm assembly	Pressure range (F) = 9
67	4	4	-	Screw	Pressure range (F) = 9
75	2	-	2	Screw	Temperature stem adaptor (H) = E, G, H, K, L, M
76	1	-	1	Heat transfer compound	Temperature stem adaptor (H) = E, G, M
-	1	1	-	Hexagonal key	NONE

Pressure and Temperature Switches - Model 4140

Maintenance and Service Parts Continued

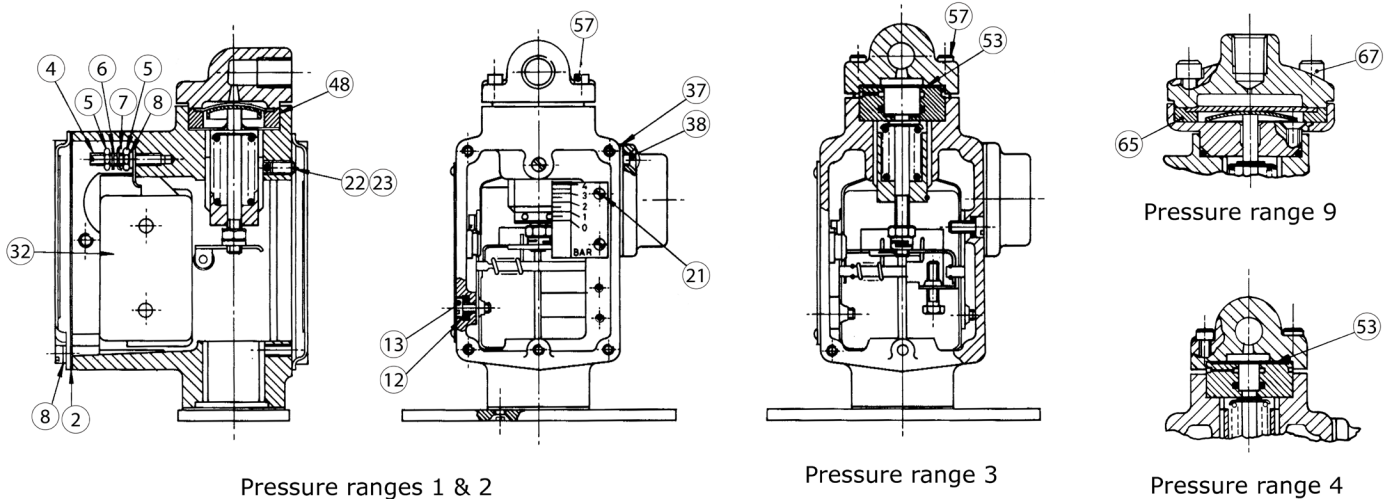
Service parts continued

4140A Temperature and Pressure Switch



4140C Single Step Pressure Switch

4140F Dual Step Pressure Switch



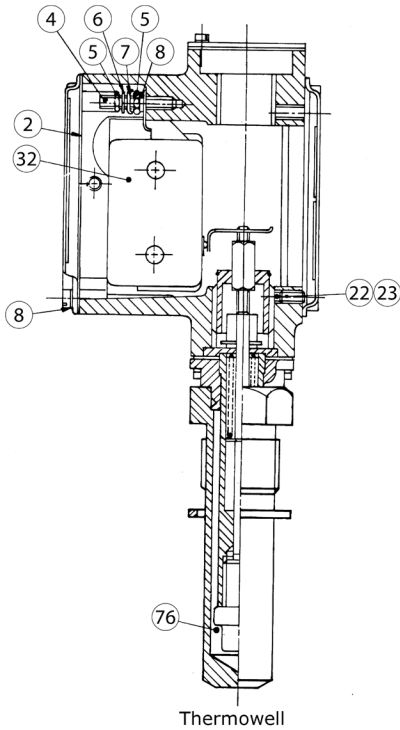
Pressure and Temperature Switches - Model 4140

Maintenance and Service Parts Continued

Service parts continued

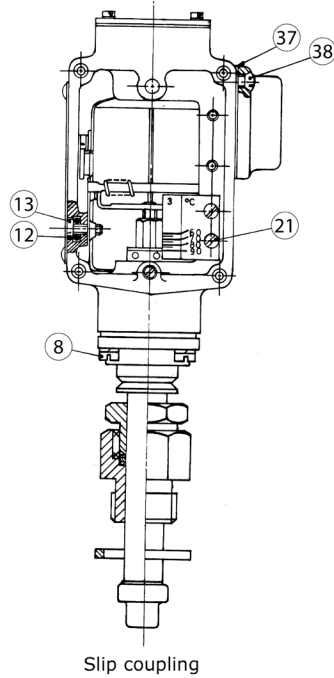
4140D Single Step Temperature Switch

4140E Dual Step Temperature Switch

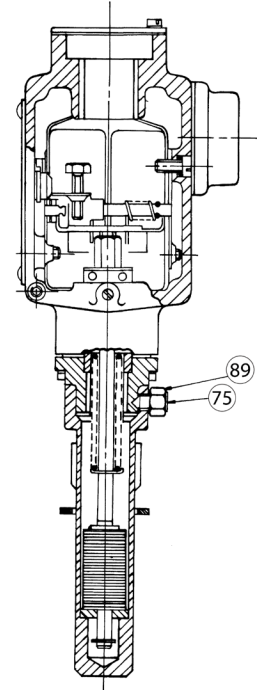


Thermowell

Temperature ranges 1 - 5



Slip coupling



Temperature range 6 (high temp)