

Installation & Maintenance Manual Digital Pressure Switch Series ZSE60F/ISE60

SAFETY

The Digital Pressure Switch and this manual contain essential information for the protection of users and others from possible injury and property damage and to ensure correct handling.

Please check that you fully understand the definition of the following messages (signs) before going on to read the text, and always follow the instructions.

IMPORTANT MESSAGES

Read this manual and follow its instructions. Signal words such as WARNING, CAUTION and NOTE, will be followed by important safety information that must be carefully reviewed.

,	,	
	Indicates a potentially hazardous situation	
	which could result in death or serious	
	injury if you do not follow instructions.	
	Indicates a potentially hazardous situation	
	which, if not avoided, may result in minor	
	injury or moderate injury.	
NOTE	Gives you helpful information.	

NOTE

Follow the instructions given below when handling the pressure switch. Otherwise, the switch may be damaged or may fail, thereby resulting in malfunction.

- Do not drop, bring into collision with other objects or apply excessive shock to the unit (980m/s² or more).
- Do not pull the lead wire with force or lift the Pressure switch by holding the lead wire. (Pulling strength less than 49N)
- Do not insert wire or other articles into the pressure port.
- Do not use with inflammable gas or liquid.
- Do not use in place which oil or chemical splashes may occur.
- In case the unit is to be placed at a location where it is exposed to water and dust, insert an air tube to the air-relieving port. (Refer to Installation)
- Connect wires and cables correctly.
- Do not perform wiring while power is on.
- Do not wire with power cable or high-voltage cable in the same wire route.
- •Connect Terminal FG to ground when using a switching regulator obtained on the commercial market.
- Insert a noise filter (line noise filter, ferrite element or other element) between the switching regulator and pressure switch when analog output is used.
- Do not press the setting buttons with a sharp pointed object.
- Warm-up for 20 to 30 minutes before detecting fine pressure.
- Initial drift of about 0.5% occurs immediately after turning the power on.

Specification

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			ZSE60F (For compound)	ISE60 (For positive)				
Rated Pressure Range		e Range	-100.0 to 100.0kPa	0.000 to 1.000MPa				
Set Pressure Range		Range	-100.0 to 100.0kPa	-0.100 to 1.000MPa				
Wi	thstand Pre	ssure	500kPa	1.5MPa				
kPa MPa		kPa	0.1	—				
		MPa	—	0.001				
Se	t pressure	kgf/cm ²	0.001	0.01				
res	solution	bar	0.001	0.01				
(N	ote1)	psi	0.02	0.1				
		mmHg	1	—				
		inHg	0.1	—				
	Enclosure		IP65(IEC	C 60529)				
	Ambient		Operation:0 to 50PC, Storage:-10 to 60PC					
	Temperature Range		(No condensation or freezing)					
t	Ambient Hurr	nidity Range	Operation Storage: 35 to 85% RH (No condensation)					
a B	Withstand	Voltage	250VAC, 1 minute (between lead block and case)					
۲ و	Insulation		2Mž or more (50VDC M)					
1 2	Withstand Voltage		(between lead block and case)					
Vibration proof			10 to 500Hz smaller one 1.5mm or 98m/s^2 $$\rm double$ amplitude, each in directions of X, Y and Z ${\rm Z}$					
	Impact proof		980m/s², 3 times each in directions of X, Y and Z respectively (De-energizing)					
	mperature aracteristic		±3% F.S. or less of detected pressure (25PC) @ temp. range of 0 to 50PC					
Material			Pipe port: SUS304, Sensor pressure sensing part: SUS630					
Port size			A2:URJ1/4 B2:TSJ1/4					
Lead wire			5-cores oil-resistance cable (0.15mm ²)					
Mass (Weight)			Approx.120g (Lead wires in 3m length included)					
(U				

Note1: With a unit selection function

(Without a unit selection function, fixed to SI units [kPa or MPa])

ZSE60F (For compound) ISE60 (For positive)

Air, Non-corrosive gases, Incombustible fluid

55mA or less (No Load)

12 to 24VDC, ripple (p-p) 10% or less

Do not disassemble, modify (including change of printed circuit board) or repair.

An injury or failure can result.

Do not operate outside of the specification range. Fire, malfunction or switch damage can result.

Do not operate in atmosphere of an inflammable, an explosive or corrosive gas. Fire, an explosion and corrosion can result.

This Pressure switch is not an explosion-proof type.

ACAUTION

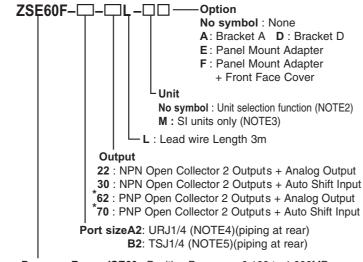
Perform proper functional checks and leak tests after maintenance.

Stop operation when an abnormality is observed such that the pressure switch does not work properly or there is a leakage of fluid. Safety can not be assured due to possible unexpected malfunction. Perform helium leak test for the leak testing of the digital pressure switch. (ZSE60F/ISE60 series)

Use ferrule made by Crawford Fittings (trade name: Swagelock® fittings) for TSJ fittings, or packing and glands made by Cajon (trade name: Cajon VCR® fittings) for URJ fittings.

Otherwise safety may not be secured due to leakage from joint. When using ferrules, packings or glands made by other manufacture, be sure to perform helium leak test to verify no leakage.(ZSE60F/ISE60 series)

Model Indication Method



Pressure Range ISE60 : Positive Pressure. -0.100 to 1.000MPa ZSE60F : Compound Pressure. -100.0 to 100.0kPa

NOTE 1: Selection with *mark are optional.

- NOTE 2: The new Measurement Law prohibits use in Japan of pressure switches with a unit selection function.
- NOTE 3: Fixed unit for compound pressure is : kPa
- for positive pressure is : MPa NOTE 4: URJ1/4 is same as VCR[®].

NPN or PNP open collector output 2 output max. load current: 80mA Switch Output max. applied voltage: 30VDC(NPN output) residual voltage: 1V or less (@ 80mA load current) ±0.2% F.S. ±1digit or less ±0.3% F.S. ±1digit or less Repeatability Hyste Hysteresis Mode Variable (from zero) resis Window Comparator Mode Fixed (3digits) (Note4) 2.5ms or less (chattering-proof function working: Response Time 24, 192, 768ms selected) Short Circuit Protection Provided 3 1/2 digits 7-segment LED display, LED Display Sampling rate: 5times/1sec ±2% F.S. ±1digit or less Indicator Accuracy (@ ambient temperature 25±3PC)

Power Supply Voltage

Current Consumption

Fluids

 Indicator
 Green LED (OUT1:Illuminate ON), Red LED (OUT2:Illuminate ON)

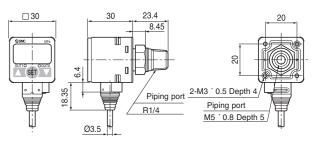
 Analog Output (Note2)
 Output Voltage: 1 to 5V ±5% F.S. or less
 Output Voltage: 1 to 5V ±2.5% F.S. or less

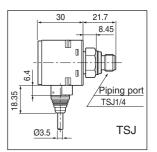
 Auto shift input (Note3)
 Non-Voltage input (reed or solid state), input 5ms or more

Note2: Applicable when voltage output is selected. Note3: Applicable when Auto shift is selected. Note4: 0.03 to 0.04psi at psi indication. Note5: Zero reset become within ±0.01psi at psi indication.

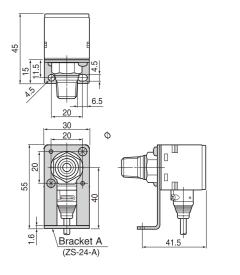
Outline Dimensions (in mm)

Dimensions of Pressure Switch

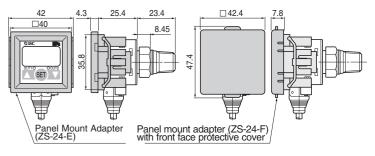




Mounting using mountig option Mounting by bracket



Panel Mount Type



ZISE##-TFI50GB-A

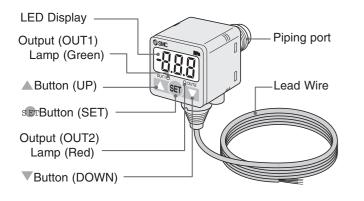
Names and Functions of Individual Parts

Pressure switch

Output (OUT1) Lamp (Green): Lit when OUT1 is ON. Output (OUT2) Lamp (Red): Lit when OUT2 is ON. LED Display: Displays a flow rate, set mode status, and error code.

Button (UP) : Selects the mode and increases a set ON/OFF value.

- Button (DOWN) : Selects the mode and decreases a set ON/OFF value.
- SET Button (SET) : Changes the mode and sets a set value.



Options

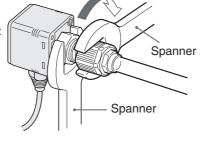
Bracket A : ZS-24-A with set screws M3 \cdot 5L (2pcs) Bracket D : ZS-24-D with set screws M3 \cdot 5L (2pcs) Panel mount adapter :ZS-24-E Panel mount adapter :ZS-24-F (with front face protective cover)

Installation

Piping

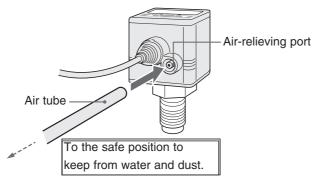
•Use Hexagon socket head plug or fitting for connection to piping.

 In order to connect hexagon socket head plug or fitting on pressure port, apply spanner at pressure port hexagon part.
 Apply a tightening torque of 13.6N·m or less.



Air tube attachment

•When the pressure switch is used in a place where water and dust splashes may occur, insert tube in the air-relieving port, and provide piping to a safe position to protect the air relieving port from water and dust. "See the figure below."



•Concerning the tube, insert it in the air-relieving port at the root. •SMC TU0425 (polyurethane, O.Dø4, I.Dø2.5) suits to this product.

Mounting

Before you mount a flow switch, read "SAFETY" and "Installation" described in this chapter carefully to obtain safe and correct measurement.

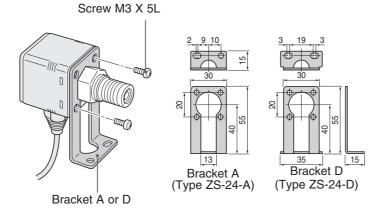
•Mount the optional bracket and panel mount adapter to the Pressure switch.

•When the Pressure switch is to be placed at a location where it is exposed to water and dust, insert an optional air tube (O.D ø4, I.D ø2.5) to the air-relieving port of Pressure switch. (Refer to the air tube attaching above)

Mounting with bracket

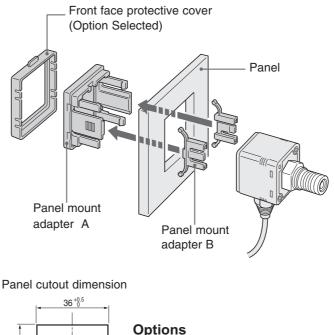
•Fix the bracket to the Pressure switch with the set screws M3 $\cdot\,$ 5L (2pcs) as attached.

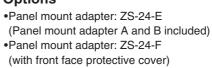
•The tightening torque of the set screws must be less than 0.98N·m.



Installation (continued)

Mounting with Panel mount adapter





Connection

Panel Thickness

1 to 3.2mm

90 90

•Make connection after turning the power off.

•Install the lead wire separately from the route for power cable or high-voltage cable.

Otherwise, malfunction may potentially result due to noise. •Be sure to ground Terminal FG when using a switching regulator obtained on the commercial market.

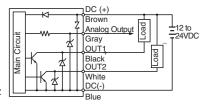
If the analog output is connected to a switching regulator obtained on the market, switching noise will be superimposed and product specification can no longer be met. This can be prevented by inserting a noise filter, such as a line noise filter and a ferrite element, between the switching regulator and the pressure switch, or by using a series power supply instead of a switching regulator.

Internal Circuit and Wiring

Output Specification

-22

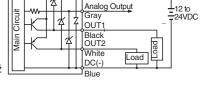
NPN Open Collector Output 2 Outputs Max. 30V, 80mA Residual voltage 1V or less Analog Output 1 to 5V Output Impedance : Approx.1kž



-30 AUTO SHIFT Input Voltage Free Contact. NPN Open Collector Output 2 Outputs Max. 30V, 80mA Residual voltage 1V or less	AUTO SHIFT Input Voltage Free Contact. NPN Open Collector Output 2 Outputs Max. 30V, 80mA
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-62 PNP Open Collector Output 2 Outputs Max. 80mA Residual voltage 1V or less Analog Output 1 to 5V

Output Impedance : Approx.1kž



DC (+)

-70
AUTO SHIFT Input
Voltage Free Contact.
PNP Open Collector Output
2 Outputs
Max. 80mA
Residual voltage 1V or less

						DC (+)			
						Brown			
		4			L	Analog O	utput	+ -	-12 to
Circuit			IJ	Ļ	ŗ	Gray			12 to 24VDC
	К		15	1	Ĺ	OUT1		_	
Main	К —		2	Z		Black OUT2	L ſ	oad	
					Γ	White a	Load	2	
					L	DC(-)		Ľ	
			_	_		Blue		-	

Setting

Setting Procedure

Measurement Mode Initialize Set output mode and response time **Pressure Setting** Input a set value for pressure to perform switch output. TL Measurement Mode Detects pressure, displays values and performs switching. Other func-

tions such as zero clear can also be set if necessary.

Initialize

Press and hold the SET button longer than two seconds. Release the SET button when [1no] is displayed and initialization can begin. When the units specification of model indication is M, the SI units will be fixed. If no symbol is supplied, unit is displayed [PA]. Refer to "Selecting Indication Unit." for details.

1. Output Mode Setting

Two output modes are available, namely, the Reverse Output mode and Non-Reverse Output mode.

The desired output mode can be set for switch output.

The output mode currently selected will be displayed.

1) First, the output mode for OUT1 is set. • Press ▲ button or ▼ button to select non- reverse output mode or reverse output mode

• Set a mode with the SET button. [1no]

In[means non-reverse output mode and [1nc] Reverse output mode means reverse output mode.

2) Then, select non-reverse output mode or reverse output mode for OUT2 by ▲ button or ▼ button similarly to OUT1.

• Set a mode with the SET button. [2no] means non-reverse output mode and [2nc] reverse output mode.

Press the SET button to move on to setting a desired response time.

2. Response Time Setting

•The response time for switch output can be set.

•Setting of the response time prevents chattering of the output. The response time currently set will be displayed. Select the desired response time by pressing the \blacktriangle or \checkmark button.

[2.5] [24] [192] [768]

Press the SET button to set and to move to setting of Pressure setting mode.

3. Pressure setting

There are two methods for pressure set-up : manual and auto preset, either one of which can be selected. The auto preset is provided for an automatic optimum set-up by using a sample for when the pressure switch is used to check absorption.

The operation mode currently selected is displayed. Press A button or v button to select the set-up method to be used.

[nAn] [AUt] (manual set-up) (auto preset)

By pressing the SET button, the control returns to measuring mode.

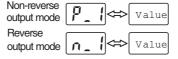
Pressure setting mode

Manual

Manually set a set value of the pressure switch.

The output method is also set in accordance with the value set manually. Set the output method while referring to the output method described below.

1. Selection of OUT1 setting mode Press the SET button during the Measurement mode. [P_1] and the current set value will display



alternately. (When the Reverse Output mode is selected in initialization, [n_1] and the set value will display alternately.)

2. Selection of set value of [P_1]

Press the A button to increase the set value or the V button to decrease the set value.

3. Set up of [P_1] and move to [P_2] setting mode

Press the SET button to set the set value and to move to the setting mode for [P_2] ([n_2] in the Reverse Output mode). [P_2] and the set value will display alternately. (When the Reverse Output mode is selected in initialization, [n_2] and the set value will be displayed alternately.)

4. Selection of set value of [P_2]

Press the \blacktriangle button to increase the set value or the \blacktriangledown button to decrease the set value.

5. Set up of [P 2] and move to OUT2 setting mode

Press the SET button to set the set value and to move to the setting mode for OUT2. Set the set value as in OUT1. [P_3] or [P_4] and the set value will be displayed alternately. (When the Reverse Output mode is selected in initialization, [n_3] or [n_4] and the set value will be displayed alternately.)

6. Completion of a set up

Completing settings for [P_1] to [P_4] ([n_1] to [n_4] in the Reverse Output mode) will finish pressure setting and return to the Measurement mode. *For the Model with Auto shift function, the mode will move to display mode of compensation value. Refer to the section of Auto shift function.

Auto Preset Setting

When auto preset is selected in Initialize, this function stores in the memory a measurement pressure as a reference value. The set value of switch is automatically set to an optimum value by repeating absorption and nonabsorption several times with a sample which is to be set up. 82 (

1. Selection of OUT1 auto preset mode

- Press the SET button to set pressure setting for OUT1 to auto preset. Display will switch to [API]. (When OUT1 setting is not necessary press \blacktriangle button and \triangledown button simultaneously.)
- 2. Preparation of unit for OUT1

Prepare a unit for which pressure for OUT1 is to be set.

3. Selection of [A1L] and pressure setting

When the SET button is pressed, [A1L] will flash. Operate the system so that the pressure changes.

- 4. Set up of OUT1 auto preset value and move to OUT2 auto preset mode When the SET button is pressed, the pressure is automatically read and set for $[P_1], [P_2]$ ($[n_1], [n_2]$ in Reverse mode).
- Display will switch to [AP2]. (When OUT2 setting is not necessary, press A button and V button simultaneously.)
- 5. Preparation of unit for OUT2 and pressure setting Prepare a unit for which pressure for OUT2 is to be set. Set the set value of OUT2 as in OUT1. [A2L] will flash.

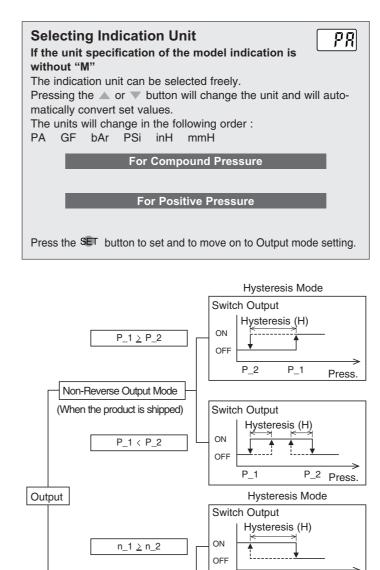
6. Set up of OUT2 auto preset value

Press the SET button to set the set value of [P_3],[P_4] ([n_3],[n_4] in Reverse mode), and auto preset mode is finished. The mode will return to the Measurement mode.

A pressure setting value in auto preset is as follows in non-reverse output mode with OUT1. (P_1,2 is n_1,2 in reverse output mode with OUT1.) P 1=A-(A-B)/4 A=maximum pressure value P 2=B+(A–B)/4 B=minimum pressure value For OUT2 set-up, above P_1,2 and n_1,2 become P_3,4 and n_3,4 respectively.

Output Method

- •Four output methods can be selected by selecting an output mode and by combining large and small set values of OUT1 and OUT2. One of these four output methods can be selected for each output.
- •OUT1 and OUT2 can be set independently.
- •One-digit flow rate conversion will be a minimum set unit. See the specification for the minimum set units.
- •When setting in the Auto Presetting mode, the Hysteresis mode will be set automatically.
- •In the Window Comparator mode, leave between [P_1] and [P_2] or between [n_1] and [n_2] a span of more than seven digits. Hysteresis in this case will be three digits fixed.
- •The following is given using OUT1 as an example. The descriptions for OUT2 are the same as those for OUT1, under the conditions that [n_1] and [n_2] should be replaced by [n_3] and [n_4] and [P_1] and [P_2] should be replaced by [P_3] and [P_4].



Reverse Output Mode

n_1 < n_2

n_2

Switch Output

n_1

ON

OFF

n_1

Window Comparator Mode

Hysteresis (H)

Press.

n_2 Press.







OUT1

Ing

Non-reverse output mode







2.5

Other Functions

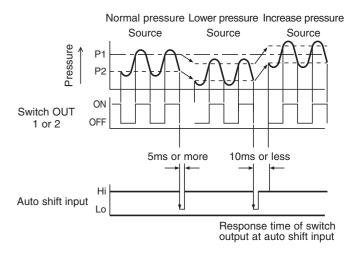
Auto shift function

When the source pressure fluctuates too much, the pressure switch may not be able to operate normally. Auto shift is provided to compensate for the fluctuation of the source pressure.

While measured pressure becomes the standard pressure value when auto shift input is received, this function corrects the set value [P 1] or [n 1] and [P 2] or [n 2] of switch OUT 1, and the set value [P_3] or [n_3] and [P_4] or [n_4] of switch OUT 2.

With Auto Shift

Set auto shift input as Lo at the time the pressure source changes, in order to memorize the pressure change and to correct the pressure set value, so that a correct decision emerges.



Conditions and explanations for auto shift function

- •Keep constant pressure for 5ms or more from the close signal of auto shift input.
- •At auto shift input, display indicates [ooo] for approx.1sec.
- Pressure value at that time is memorized as corrected value [C_5]. •With corrected value which is memorized, set value [P_1] to [P_4] or [n_1] to [n_4] are compensated.
- •The span is 10ms or less until the switch output operates after auto shift input.
- •When the corrected set value exceeds the accepted set range with auto shift input, the corrected value is not memorized. When exceeding the high limit the display indicates [UUU], and when exceeding the low limit the display indicates [LLL].
- •When completing the pressure setting of OUT2, the corrected value and [C_5] will be displayed alternately.
- Press the SET button to set and return to Measurement mode. •The Corrected value [C_5] after auto shift input setting, will be lost if the power is dis-connected, and is reset to zero (Initial value) when the power is re-supplied.

Note: There is No EEprom in the memory for the corrected value.

	Set pressure range	Accepted set range
For compound	-100.0 to 100.0 kPa	-100.0 to 100.0 kPa
For positive	- 0.1 to 1.000 MPa	-1.000 to 1.000 MPa

Using with auto shift input, accepted set range is as follows:-

Other Functions (continue)

Peak and Bottom Hold Display Function

To reset holding, press and hold the ▲ button for more than one second. The display will return to measurement mode. For bottom hold, Press and hold the ▼ button for longer than one second to hold the minimum pressure value. The display will flash. To reset holding, press and hold the ▼ button for more than one second. The display will return to measurement mode.

Key Lock Function

This function prevents errors such as changing a set value by mistake.

Lock

Unl

•Press and hold the SET button longer than four seconds, Release the button when [UnL] is displayed.

•Press the
button to set the display to [LoC]

•Press the SET button to return to the Measurement mode.

Unlock

•Press and hold the SET button longer than four seconds.

Release the button when [LoC] is displayed.

•Press the **A** button to change the display to [unL]

•Press the SET button to return to the Measurement mode.

Zero Clear Function

The displayed value can be adjusted to zero when pressure to be measured is within – 70 digits of the atmospheric pressure. This function is useful because it enables the detection of pressure fluctuations larger than a certain value without being influenced by fluctuations of source pressure. Press and hold the \blacktriangle and \checkmark buttons simultaneously to reset to "0" on the display, and return to Measurement mode automatically.

Error Display Function

This function displays error location and nature when a problem or an error occurs.

Error name		Display of error	Contents	Disposition		
current		Er 1 Er 2	Over 80mA load current is flow- ing to the switch output.	Turn the power off and remove the cause of the over-current, Then turn the power on.		
Residual pressure error		{r}}	Performing zero reset, the following pressure applied to ambient pressure. [ISE50/60: Over - 0.071MPa] *After 3 sec., measurement mode	After changing the applied pressure into ambient pressure, re-perform zero reset.		
Applied pressure error			Pressure outside of high limit of set pressure range is applied.	Reset applied pressure into within		
			Pressure outside of low limit of set pressure range is applied.	set pressure range.		
Auto shift error			Corrected set value exceeds high limit of the accepted set range. *After 1 sec., measurement mode recovers automatically.	Re-set up the pressur set value so that th corrected set value whic added the measuremer		
		LLL	Corrected set value exceeds low limit of the accepted set range. *After 1 sec., measurement mode recovers automatically.	pressure value with auto shift signal to the pressure set value does not exceed the accepted set range.		
		EгЧ	Internal data error causes this display.			
System	n	Erb	Internal data error causes this display.	Turn off the power, and turn on again. If resetting fails, an		
error		Er7	Internal data error causes this display.	investigation by SMC is required.		
	٤		Internal data error causes this display.	·		

t mode.

Contact

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NETHERLANDS NORWAY POLAND PORTUGAL SLOVAKIA SLOVENIA SPAIN SWEDEN SWITZERLAND UNITED KINGDOM

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