

1 压力传感器--零点标定

在进行压力传感器零点标定前，必须将所有阀片的工作口的气体排空。

1、关闭（切断）阀岛的 1 口和 3 口的压缩空气供应和真空供应。

2、通过对象 0x243C:00 和 0x243D:00 读取供气压力和排气压力，如下图所示：

General	Read Objects		☒ Auto update	☒ Offline from ESI file	☐ Online from device
Expert Process Data	Index:Subindex	Name	Flags	Type	Value
Process Data	16#2431:16#00	Pressure Control Tuning Valve 4 at (4)			
Startup Parameters	16#2432:16#00	Pressure Control Data Valve 0 at (2)			
Online	16#2433:16#00	Pressure Control Data Valve 0 at (4)			
CoE Online	16#2434:16#00	Pressure Control Data Valve 1 at (2)			
Diagnosis History	16#2435:16#00	Pressure Control Data Valve 1 at (4)			
	16#2436:16#00	Pressure Control Data Valve 2 at (2)			
	16#2437:16#00	Pressure Control Data Valve 2 at (4)			
	16#2438:16#00	Pressure Control Data Valve 3 at (2)			
Log	16#2439:16#00	Pressure Control Data Valve 3 at (4)			
EtherCAT I/O Mapping	16#243A:16#00	Pressure Control Data Valve 4 at (2)			
	16#243B:16#00	Pressure Control Data Valve 4 at (4)			
EtherCAT IEC Objects	16#243C:16#00	Supply pressure	RO	DINT	-2
	16#243D:16#00	Exhaust pressure	RO	DINT	1289
Status	16#243E:16#00	Barometric pressure	RO	DINT	103017
	16#243F:16#00	Supply temperature	RO	DINT	2623
Information	16#2440:16#00	Exhaust temperature	RO	DINT	2625
	16#2441:16#00	Barometric temperature	RO	DINT	2682
	16#2442:16#00	Temperature Valve 0 at (2)	RO	DINT	2634
	16#2443:16#00	Temperature Valve 0 at (4)	RO	DINT	2632
	16#2444:16#00	Temperature Valve 1 at (2)	RO	DINT	2623
	16#2445:16#00	Temperature Valve 1 at (4)	RO	DINT	2632
	16#2446:16#00	Temperature Valve 2 at (2)	RO	DINT	2618
	16#2447:16#00	Temperature Valve 2 at (4)	RO	DINT	2629
	16#2448:16#00	Temperature Valve 3 at (2)	RO	DINT	2618
	16#2449:16#00	Temperature Valve 3 at (4)	RO	DINT	2598
	16#244A:16#00	Temperature Valve 4 at (2)	RO	DINT	2611
	16#244B:16#00	Temperature Valve 4 at (4)	RO	DINT	2618
	16#244C:16#00	Pressure sensor zero point adjustment			

3、等待直到显示压力值在 - 3000 ... +3000 Pa 的范围内。

4、通过控制字将所有工作口切换至排气状态，如下图所示：

通过过程数据给所有工作口的控制字写 1，从而使所有工作口进行排气。

EtherCAT_Master		CPX_E_System	Device	VTEP_CS x						
General	Find	Filter	Show all	+ Add FB for IO Channel...	Go to Instance					
Expert Process Data	Variable	Mapping	Channel	Address	Type	Default Value	Current Value	Prepared Value	Unit	Description
Process Data	+		Setpoint Pressure Valve 0 at (2)	%Q03	DINT	0				Setpoint Pressure Valve 0 at (2)
	+		Control Word Valve 0 at (2)	%Q04	DINT	0		1		Control Word Valve 0 at (2)
Startup Parameters	+		Setpoint Pressure Valve 0 at (4)	%Q05	DINT	0				Setpoint Pressure Valve 0 at (4)
	+		Control Word Valve 0 at (4)	%Q06	DINT	0		1		Control Word Valve 0 at (4)
Online	+		Setpoint Pressure Valve 1 at (2)	%Q07	DINT	0				Setpoint Pressure Valve 1 at (2)
	+		Control Word Valve 1 at (2)	%Q08	DINT	0		1		Control Word Valve 1 at (2)
CoE Online	+		Setpoint Pressure Valve 1 at (4)	%Q09	DINT	0				Setpoint Pressure Valve 1 at (4)
	+		Control Word Valve 1 at (4)	%Q10	DINT	0		1		Control Word Valve 1 at (4)
Diagnosis History	+		Setpoint Pressure Valve 2 at (2)	%Q11	DINT	0				Setpoint Pressure Valve 2 at (2)
	+		Control Word Valve 2 at (2)	%Q12	DINT	0		1		Control Word Valve 2 at (2)
Log	+		Setpoint Pressure Valve 2 at (4)	%Q13	DINT	0				Setpoint Pressure Valve 2 at (4)
	+		Control Word Valve 2 at (4)	%Q14	DINT	0		1		Control Word Valve 2 at (4)
EtherCAT I/O Mapping	+		Setpoint Pressure Valve 3 at (2)	%Q15	DINT	0				Setpoint Pressure Valve 3 at (2)
	+		Control Word Valve 3 at (2)	%Q16	DINT	0		1		Control Word Valve 3 at (2)
EtherCAT IEC Objects	+		Setpoint Pressure Valve 3 at (4)	%Q17	DINT	0				Setpoint Pressure Valve 3 at (4)
	+		Control Word Valve 3 at (4)	%Q18	DINT	0		1		Control Word Valve 3 at (4)
Status	+		Setpoint Pressure Valve 4 at (2)	%Q19	DINT	0				Setpoint Pressure Valve 4 at (2)
	+		Control Word Valve 4 at (2)	%Q20	DINT	0		1		Control Word Valve 4 at (2)
Information	+		Setpoint Pressure Valve 4 at (4)	%Q21	DINT	0				Setpoint Pressure Valve 4 at (4)
	+		Control Word Valve 4 at (4)	%Q22	DINT	0		1		Control Word Valve 4 at (4)
	+		Actual Pressure Valve 0 at (2)	%ID3	DINT	-71				Actual Pressure Valve 0 at (2)
	+		Status Word Valve 0 at (2)	%ID4	DINT	0				Status Word Valve 0 at (2)
	+		Actual Pressure Valve 0 at (4)	%ID5	DINT	33				Actual Pressure Valve 0 at (4)
	+		Status Word Valve 0 at (4)	%ID6	DINT	0				Status Word Valve 0 at (4)
	+		Actual Pressure Valve 1 at (2)	%ID7	DINT	-33				Actual Pressure Valve 1 at (2)
Setpoint Pressure Valve 2 at (4)										
Reset Mapping Always update variables Use parent device settings										

通过 COE Online 查看控制字及状态字的写入状态，所有工作口均为 1 即可。

Index:Subindex	Name	Flags	Type	Value
16#2401:16#00	Control Word Valve 0 at (2)	RW	DINT	1
16#2402:16#00	Setpoint Pressure Valve 0 at (4)	RW	DINT	0
16#2403:16#00	Control Word Valve 0 at (4)	RW	DINT	1
16#2404:16#00	Setpoint Pressure Valve 1 at (2)	RW	DINT	0
16#2405:16#00	Control Word Valve 1 at (2)	RW	DINT	1
16#2406:16#00	Setpoint Pressure Valve 1 at (4)	RW	DINT	0
16#2407:16#00	Control Word Valve 1 at (4)	RW	DINT	1
16#2408:16#00	Setpoint Pressure Valve 2 at (2)	RW	DINT	0
16#2409:16#00	Control Word Valve 2 at (2)	RW	DINT	1
16#240A:16#00	Setpoint Pressure Valve 2 at (4)	RW	DINT	0
16#240B:16#00	Control Word Valve 2 at (4)	RW	DINT	1
16#240C:16#00	Setpoint Pressure Valve 3 at (2)	RW	DINT	0
16#240D:16#00	Control Word Valve 3 at (2)	RW	DINT	1
16#240E:16#00	Setpoint Pressure Valve 3 at (4)	RW	DINT	0
16#240F:16#00	Control Word Valve 3 at (4)	RW	DINT	1
16#2410:16#00	Setpoint Pressure Valve 4 at (2)	RW	DINT	0
16#2411:16#00	Control Word Valve 4 at (2)	RW	DINT	1
16#2412:16#00	Setpoint Pressure Valve 4 at (4)	RW	DINT	0
16#2413:16#00	Control Word Valve 4 at (4)	RW	DINT	1
16#2414:16#00	Actual Pressure Valve 0 at (2)	RO	DINT	-68
16#2415:16#00	Status Word Valve 0 at (2)	RO	DINT	1
16#2416:16#00	Actual Pressure Valve 0 at (4)	RO	DINT	16
16#2417:16#00	Status Word Valve 0 at (4)	RO	DINT	1
16#2418:16#00	Actual Pressure Valve 1 at (2)	RO	DINT	-30
16#2419:16#00	Status Word Valve 1 at (2)	RO	DINT	1
16#241A:16#00	Actual Pressure Valve 1 at (4)	RO	DINT	-100
16#241B:16#00	Status Word Valve 1 at (4)	RO	DINT	0
16#241C:16#00	Actual Pressure Valve 2 at (2)	RO	DINT	-60

5、等待至少 5s 的时间。之后进行下一步操作。

6、通过对象 0x244C:01 和 02 进行零点校准的操作。按照下图方法进行：

Index:Subindex	Name	Flags	Type	Value
16#2446:16#00	Temperature Valve 2 at (2)	RO	DINT	2861
16#2447:16#00	Temperature Valve 2 at (4)	RO	DINT	2873
16#2448:16#00	Temperature Valve 3 at (2)	RO	DINT	2859
16#2449:16#00	Temperature Valve 3 at (4)	RO	DINT	2841
16#244A:16#00	Temperature Valve 4 at (2)	RO	DINT	2854
16#244B:16#00	Temperature Valve 4 at (4)	RO	DINT	2862
16#244C:16#01	Pressure sensor zero point adjustmentControl	RW	DINT	1
16#244C:16#02	Pressure sensor zero point adjustmentStatus	RO	DINT	2
16#244D:16#00	Pressure sensor zero point adjustmentOut0	RO	DINT	0
16#244E:16#00	Pressure sensor zero point adjustmentOut1	RO	DINT	0
16#244F:16#00	Pressure sensor zero point adjustmentOut2	RO	DINT	0
16#2450:16#00	Pressure sensor zero point adjustmentOut3	RO	DINT	0
16#2451:16#00	Pressure sensor offset Valve 1 at (2)	RO	DINT	50
16#2452:16#00	Pressure sensor offset Valve 1 at (4)	RO	DINT	97
16#2453:16#00	Pressure sensor offset Valve 2 at (2)	RO	DINT	86
16#2454:16#00	Pressure sensor offset Valve 2 at (4)	RO	DINT	89
16#2455:16#00	Pressure sensor offset Valve 3 at (2)	RO	DINT	-34
16#2456:16#00	Pressure sensor offset Valve 3 at (4)	RO	DINT	-39
16#2457:16#00	Pressure sensor offset Valve 4 at (2)	RO	DINT	159
16#2458:16#00	Pressure sensor offset Valve 4 at (4)	RO	DINT	54
16#2459:16#00	CP_Setpoint Pressure Valve 0 at (2)	RW	UINT	0
16#245A:16#00	CP_Control Word Valve 0 at (2)	RW	USINT	0
16#245B:16#00	CP_Setpoint Pressure Valve 0 at (4)	RW	UINT	0
16#245C:16#00	CP_Control Word Valve 0 at (4)	RW	USINT	0
16#245D:16#00	CP_Setpoint Pressure Valve 1 at (2)	RW	UINT	0

1、在adjustmentControl窗口内

写入1

2、等待adjustmentStatus窗口内

的数值变为2后，代表执行零点

校准工作完成，此时紫色窗口内

的数值将会自动刷新

3、再次将adjustmentControl窗

口的数值写位0，完成操作。

在执行零点校准时的各种状态可参考下表对应查询。

Index	Name	Type	Flags ¹⁾	Value
0x244C:00	Pressure sensor zero point adjustment			
0x244C:01	Pressure sensor zero point adjustment control	DINT	RW	0 = reset 1 = execute (rising edge)
0x244C:02	Pressure sensor zero point adjustment status	DINT	RO	0 = ready 1 = executing 2 = finished 3 = error
0x244C:03	Pressure sensor zero point adjustment In0	DINT	RW	Bitmask (0 = all available channels/valves) Bit 0 = channel 0 Bit 1 = channel 1 Bit 2 = channel 2 Bit 3 = channel 3 Bit 4 = channel 4 Bit 5 = channel 5 Bit 6 = channel 6 Bit 7 = channel 7 Bit 8 = channel 8 Bit 9 = channel 9 Bit 10 = Supply pressure Bit 11 = Exhaust pressure
0x244C:04	Pressure sensor zero point adjustment Out0	DINT	RO	0 = success 1 = error

2 压电片偏移在线校准

在进行调整之前，必须将所有工作口压力调节到所需的工作压力。

- 1、通过过程数据设置工作口的压力值。
- 2、通过控制字将所有工作口切换至控制模式（即 3）。如下图所示：
通过过程数据窗口，设置工作口气压以及所有工作口全部切入至 **controlled** 的工作模式。

Variable	Mapping	Channel	Address	Type	Default Value	Current Value	Prepared Value	Unit	Description
Setpoint Pressure Valve 0 at (2)		%QD3	DINT	0	100000				Setpoint Pressure Valve 0 at (2)
Control Word Valve 0 at (2)		%QD4	DINT	1	3				Control Word Valve 0 at (2)
Setpoint Pressure Valve 0 at (4)		%QD5	DINT	0	100000				Setpoint Pressure Valve 0 at (4)
Control Word Valve 0 at (4)		%QD6	DINT	1	3				Control Word Valve 0 at (4)
Setpoint Pressure Valve 1 at (2)		%QD7	DINT	0	100000				Setpoint Pressure Valve 1 at (2)
Control Word Valve 1 at (2)		%QD8	DINT	1	3				Control Word Valve 1 at (2)
Setpoint Pressure Valve 1 at (4)		%QD9	DINT	0	100000				Setpoint Pressure Valve 1 at (4)
Control Word Valve 1 at (4)		%QD10	DINT	1	3				Control Word Valve 1 at (4)
Setpoint Pressure Valve 2 at (2)		%QD11	DINT	0	100000				Setpoint Pressure Valve 2 at (2)
Control Word Valve 2 at (2)		%QD12	DINT	1	3				Control Word Valve 2 at (2)
Setpoint Pressure Valve 2 at (4)		%QD13	DINT	0	100000				Setpoint Pressure Valve 2 at (4)
Control Word Valve 2 at (4)		%QD14	DINT	1	3				Control Word Valve 2 at (4)
Setpoint Pressure Valve 3 at (2)		%QD15	DINT	0	100000				Setpoint Pressure Valve 3 at (2)
Control Word Valve 3 at (2)		%QD16	DINT	1	3				Control Word Valve 3 at (2)
Setpoint Pressure Valve 3 at (4)		%QD17	DINT	0	100000				Setpoint Pressure Valve 3 at (4)
Control Word Valve 3 at (4)		%QD18	DINT	1	3				Control Word Valve 3 at (4)
Setpoint Pressure Valve 4 at (2)		%QD19	DINT	0	100000				Setpoint Pressure Valve 4 at (2)
Control Word Valve 4 at (2)		%QD20	DINT	1	3				Control Word Valve 4 at (2)
Setpoint Pressure Valve 4 at (4)		%QD21	DINT	0	100000				Setpoint Pressure Valve 4 at (4)
Control Word Valve 4 at (4)		%QD22	DINT	1	3				Control Word Valve 4 at (4)
Actual Pressure Valve 0 at (2)		%ID5	DINT	-3					Actual Pressure Valve 0 at (2)
Status Word Valve 0 at (2)		%ID4	DINT	1					Status Word Valve 0 at (2)
Actual Pressure Valve 0 at (4)		%ID5	DINT	16					Actual Pressure Valve 0 at (4)
Status Word Valve 0 at (4)		%ID6	DINT	1					Status Word Valve 0 at (4)
Actual Pressure Valve 1 at (2)		%ID7	DINT	27					Actual Pressure Valve 1 at (2)

通过 COE Online 查看所有工作口的实际气压是否到达设定压力及通过状态字查看工作口的工作模式是否已切换为 3 controlled。

Index/Subindex	Name	Flags	Type	Value
16#2410:16#00	Setpoint Pressure Valve 4 at (2)	RW	DINT	100000
16#2411:16#00	Control Word Valve 4 at (2)	RW	DINT	3
16#2412:16#00	Setpoint Pressure Valve 4 at (4)	RW	DINT	100000
16#2413:16#00	Control Word Valve 4 at (4)	RW	DINT	3
16#2414:16#00	Actual Pressure Valve 0 at (2)	RO	DINT	98169
16#2415:16#00	Status Word Valve 0 at (2)	RO	DINT	3
16#2416:16#00	Actual Pressure Valve 0 at (4)	RO	DINT	99456
16#2417:16#00	Status Word Valve 0 at (4)	RO	DINT	3
16#2418:16#00	Actual Pressure Valve 1 at (2)	RO	DINT	99687
16#2419:16#00	Status Word Valve 1 at (2)	RO	DINT	3
16#241A:16#00	Actual Pressure Valve 1 at (4)	RO	DINT	101289
16#241B:16#00	Status Word Valve 1 at (4)	RO	DINT	3
16#241C:16#00	Actual Pressure Valve 2 at (2)	RO	DINT	99147
16#241D:16#00	Status Word Valve 2 at (2)	RO	DINT	3
16#241E:16#00	Actual Pressure Valve 2 at (4)	RO	DINT	98349
16#241F:16#00	Status Word Valve 2 at (4)	RO	DINT	3
16#2420:16#00	Actual Pressure Valve 3 at (2)	RO	DINT	98730
16#2421:16#00	Status Word Valve 3 at (2)	RO	DINT	3
16#2422:16#00	Actual Pressure Valve 3 at (4)	RO	DINT	100161
16#2423:16#00	Status Word Valve 3 at (4)	RO	DINT	3
16#2424:16#00	Actual Pressure Valve 4 at (2)	RO	DINT	99204
16#2425:16#00	Status Word Valve 4 at (2)	RO	DINT	3
16#2426:16#00	Actual Pressure Valve 4 at (4)	RO	DINT	98656
16#2427:16#00	Status Word Valve 4 at (4)	RO	DINT	3
16#2428:16#00	Pressure Control Tuning Valve 0 at (2)			
16#2429:16#00	Pressure Control Tuning Valve 0 at (4)			
16#242A:16#00	Pressure Control Tuning Valve 1 at (2)			
16#242B:16#00	Pressure Control Tuning Valve 1 at (4)			

- 3、等待至少 40 秒的时间。
- 4、通过对象 0x248E:01 和 02 进行压电片偏移在线校准的操作。按照下图方法进行：

- (1) 首先将对象 0x248E:01 写入 1 开始执行在线校准。
- (2) 观察等待对象 0x248E:02 窗口显示 2 代表执行成功。
- (3) 成功后将对象 0x248E:01 写入 0，完成校准操作。

General

Expert Process Data

Process Data

Startup Parameters

Online

CoE Online

Diagnosis History

Log

EtherCAT I/O Mapping

EtherCAT IEC Objects

Status

Information

 Read Objects

☒ Auto update

☒ Offline from ESI file

☐ Online from device

Index/Subindex	Name	Flags	Type	Value
16#247D:16#00	CP_Actual Pressure Valve 4 at (2)	RO	UINT	1000
16#247E:16#00	CP_Status Word Valve 4 at (2)	RO	USINT	3
16#247F:16#00	CP_Actual Pressure Valve 4 at (4)	RO	UINT	1000
16#2480:16#00	CP_Status Word Valve 4 at (4)	RO	USINT	3
16#2481:16#00	CP_Special_Reset	RW	USINT	0
16#2482:16#00	CPU temperature	RO	INT	33
+ 16#2483:16#00	Festo_Internal_Testing			
+ 16#2484:16#00	Supply Pressure Monitor			
+ 16#2485:16#00	Terminal Ident			
+ 16#2486:16#00	Valve 0 Ident			
+ 16#2487:16#00	Valve 1 Ident			
+ 16#2488:16#00	Valve 2 Ident			
+ 16#2489:16#00	Valve 3 Ident			
+ 16#248A:16#00	Valve 4 Ident			
16#248B:16#00	Pressure Sensor Noise Reduction	RW	UDINT	0
16#248C:16#00	Energy Efficiency Mode	RW	UDINT	0
+ 16#248D:16#00	Save Piezo Offsets Persistent			
- 16#248E:16#00	Piezo Offset Online Adaption			
:16#01	Piezo Offset Online Adaption Control	RW	DINT	0
:16#02	Piezo Offset Online Adaption Status	RO	DINT	0
:16#03	Piezo Offset Online Adaption In0	RW	DINT	0
:16#04	Piezo Offset Online Adaption In1	RW	DINT	0
:16#05	Piezo Offset Online Adaption In2	RW	DINT	0
:16#06	Piezo Offset Online Adaption Out0	RO	DINT	0
:16#07	Piezo Offset Online Adaption Out1	RO	DINT	0
:16#08	Piezo Offset Online Adaption Out2	RO	DINT	0
:16#09	Piezo Offset Online Adaption Out3	RO	DINT	0



压电片偏移校准对应状态表。

Index	Size (bytes)	Name	Type	Flags ¹⁾	Value
0x248E:00	—	Piezo offset online adaptation	—	—	—
0x248E:01	4	Piezo offset online adaptation control	DINT	RW	0 = reset 1 = execute (rising edge)
0x248E:02	4	Piezo offset online adaptation status	DINT	RW	0 = ready 1 = executing 2 = finished 3 = error
0x248E:03	4	Piezo offset online adaptation In0	DINT	RW	Bitmask (0 = all available channels/valves) Bit 0 = channel 0 Bit 1 = channel 1 Bit 2 = channel 2 Bit 3 = channel 3 Bit 4 = channel 4 Bit 5 = channel 5 Bit 6 = channel 6 Bit 7 = channel 7 Bit 8 = channel 8 Bit 9 = channel 9
0x248E:06	4	Piezo offset online adaptation Out0	DINT	RO	0 = Success 1 = Error