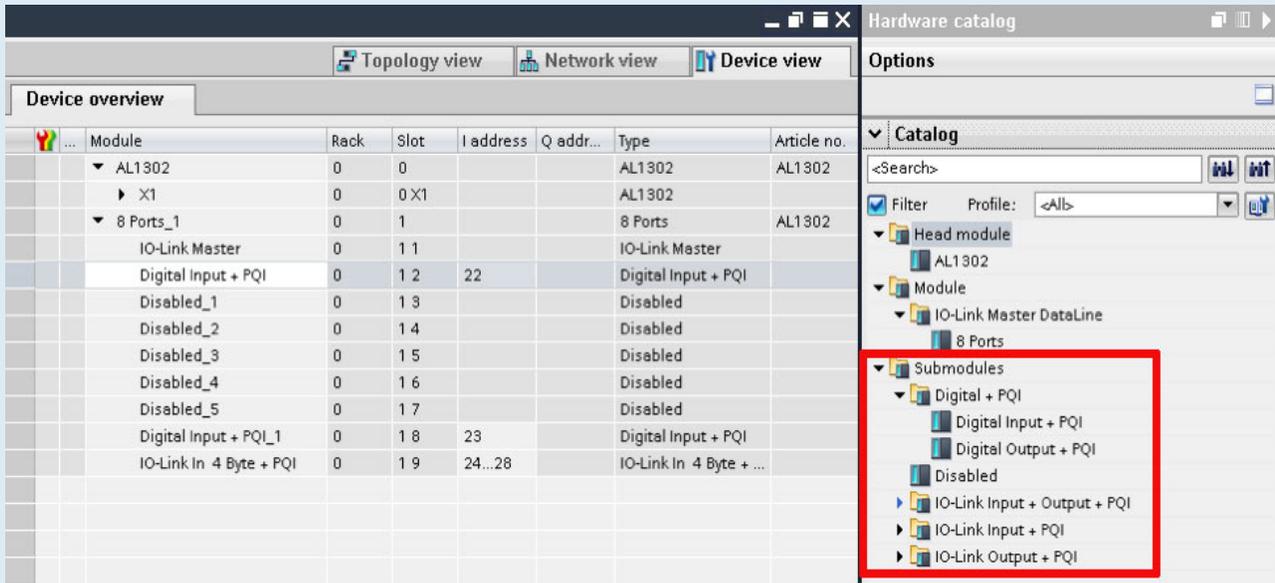# What is the byte structure for the PQI data in the Siemens TIA portal?

In the Siemens TIA portal, ports on IO-Link masters can be configured as digital inputs, digital outputs, IO-Link inputs or IO-Link outputs. For Profinet masters, the port also includes Port Qualifier Information (PQI)

What is PQI?

PQI contains diagnostic information about the IO-Link port in question. In addition to the bytes for process data, which are automatically allocated in the TIA portal, an additional byte provides the diagnostic information according to the chart below.

Bit							
7	6	5	4	3	2	1	0
PQ	DE	DA	--	--	--	DI2	DI4

Legend	Description	Status	Meaning
DI4	Switching status of digital input on pin 4.	FALSE	Output is off
		TRUE	Output is on
DI2	Switching status of digital input on pin 2 (if used).	FALSE	Output is off
		TRUE	Output is on
DA	Device Available: shows if the device is recognized and in the "preoperate" or "operate" state.	FALSE	Device not found
		TRUE	Device found
DE	Device Error: shows if an error or warning occurred. Refer to acyclic messages to determine cause of fault.	FALSE	No error
		TRUE	Error detected
PQ	Port Qualifier: shows if the IO-Link data is valid.	FALSE	Data invalid
		TRUE	Data valid

Example 1:

The screen shot shows port 1 of an AL1302 master set up as a digital Input + PQI. The address for this port is assgined 22.

		Module	Rack	Slot	I address	Q addr...	Type	Article no.
		▼ AL1302	0	0			AL1302	AL1302
		▶ X1	0	0 X1			AL1302	
		▼ 8 Ports_1	0	1			8 Ports	AL1302
		IO-Link Master	0	1 1			IO-Link Master	
		Digital Input + PQI	0	1 2	22		Digital Input + PQI	
		Disabled_1	0	1 3			Disabled	
		Disabled_2	0	1 4			Disabled	
		Disabled_3	0	1 5			Disabled	
		Disabled_4	0	1 6			Disabled	
		Digital Output + PQI	0	1 7	0	16	Digital Output + PQI	
		Digital Input + PQI_1	0	1 8	23		Digital Input + PQI	
		IO-Link In 4 Byte + PQI	0	1 9	24...28		IO-Link In 4 Byte + ...	

According to the PQI chart:

- Bit 22.0 shows if the digital output on pin 4 is on or off.
- Bit 22.1 shows if the digital output on pin 2 is on or off.
- Bit 22.5 shows if the connected device is found or not.
- Bit 22.6 shows if the connected device is in an error state or not.
- Bit 22.7 shows if the IO-Link data is valid or not.

Example 2:

Now, the port is set up for 4 bytes of IO-Link process data + PQI.

		Module	Rack	Slot	I address	Q addr...	Type	Article no.
		▼ AL1302	0	0			AL1302	AL1302
		▶ X1	0	0 X1			AL1302	
		▼ 8 Ports_1	0	1			8 Ports	AL1302
		IO-Link Master	0	1 1			IO-Link Master	
		Digital Input + PQI	0	1 2	22		Digital Input + PQI	
		Disabled_1	0	1 3			Disabled	
		Disabled_2	0	1 4			Disabled	
		Disabled_3	0	1 5			Disabled	
		Disabled_4	0	1 6			Disabled	
		Digital Output + PQI	0	1 7	0	16	Digital Output + PQI	
		Digital Input + PQI_1	0	1 8	23		Digital Input + PQI	
		IO-Link In 4 Byte + PQI	0	1 9	24...28		IO-Link In 4 Byte + ...	

In this example:

- Bytes 24, 25, 26 and 27 contain the raw process data from the device.
- Bit 28.5 shows if the connected device is found or not.
- Bit 28.6 shows if the connected device is in an error state or not.
- Bit 28.7 shows if the IO-Link data is valid or not.