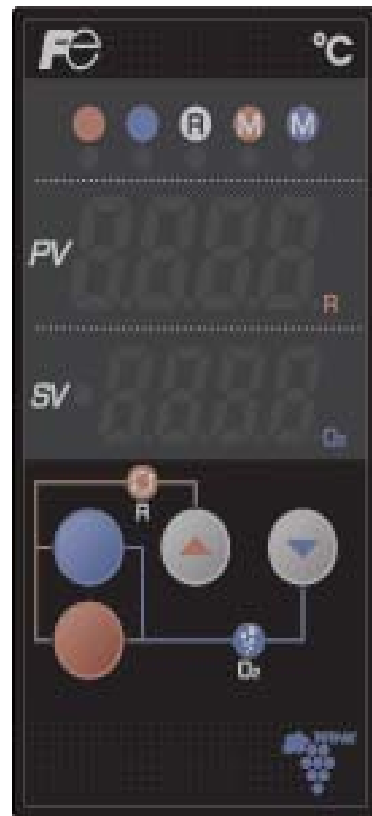# Fuji Electric
PXG WINE Controller
Temperature Controller with Micro-Oxygenation Function Especially Designed for Oenology

Key Features:

- ➢ AC/DC 24V Power Supply
- ➢ 1 relay output (remounting/pumping over)
- ➢ 1 relay output (oxygenation)
- ➢ Format 48x96 depth 79mm
- ➢ ON/OFF or PID control mode

Fuji Electric Systems Co., Ltd.   April 2006

Fuji Electric, in consultation with leading oenologists, has developed a precise temperature controller, the PXG Wine, uniquely suited to the demands of the winemaking industry. Featuring exacting standards for temperature control and the ability to regulate oxygenation, the Fuji Electric PXG Wine is a smart, cost-effective way to control the critical functions of winemaking.

Grapes to glass, the process of crafting fine wines is dependant upon maintaining precise control over temperatures during critical junctures. At every moment in the process of winemaking, there is an optimal temperature that must be maintained to control the biological and chemical processes involved with winemaking. Accurate control of these temperatures contributes to the improvement in the final character and quality of the wine. Simply put, maintaining optimal temperatures during the process of vinification influences:

- Development of the flavors of the grape
- Clarification of musts and wines
- Optimal development then inhibition of yeasts and bacteria
- Extraction of the pellicle compounds; tannins and anthocyanins
- Optimization of oxydo-reduction and etherification
- Blooming of the olfactive and gustatory characters of the wine

Advanced heating and cooling systems allow vintners to intervene in an active way in the processes being held in the vat during the wine making. Heating and cooling systems can modify these processes if necessary and direct them in the desired direction. The Fuji Electric PXG Wine allows precision temperature control for exacting vinification standards.

The Process of Making Wines:
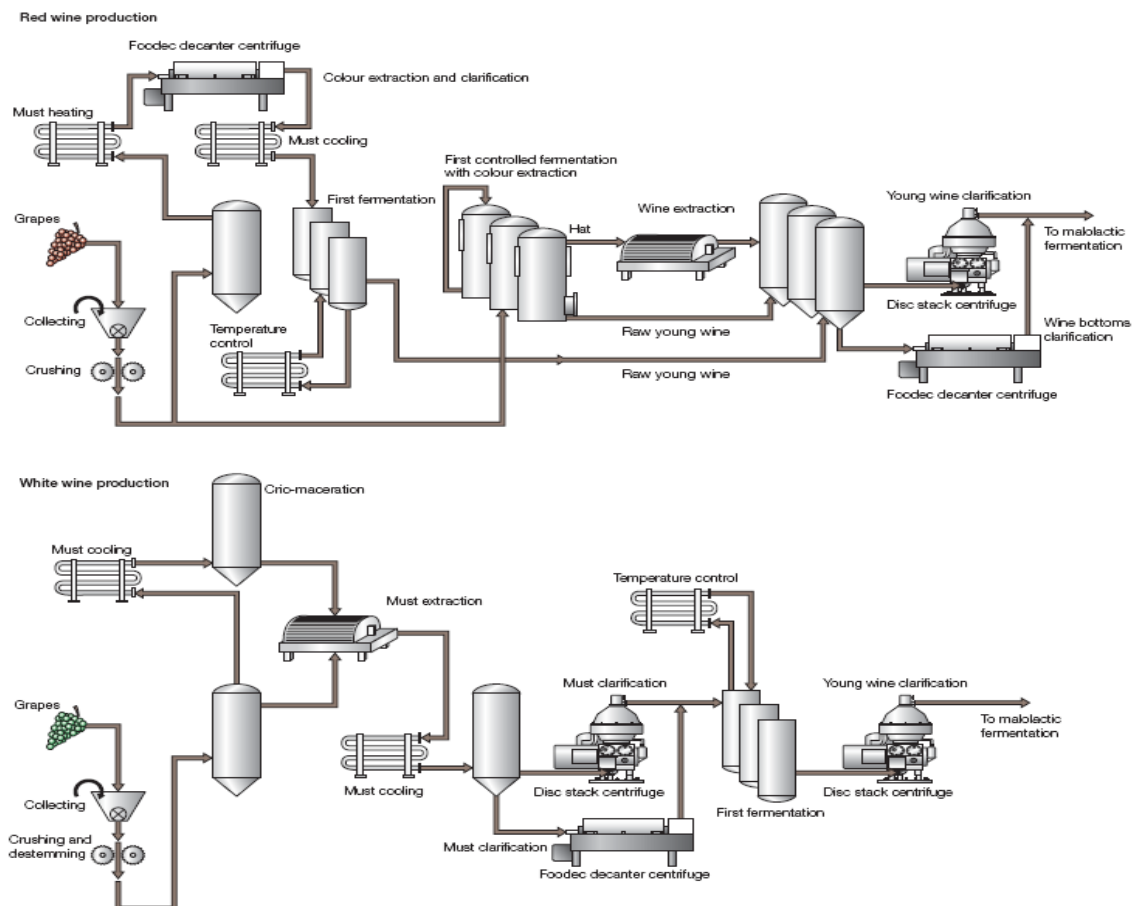
Steps of Wine Making that Require Precise Temperature Control:

        Cryoextraction: The process by which grapes are frozen prior to pressing. The temperature of the grapes is lowered to around -7º C and pressed while still frozen. Ice crystals remain in the press while concentrated juice flows out.

        Pre-Fermentation Cold Maceration: By keeping temperatures cool (around 8ºC) during maceration, the period can be extended without fermentation. Maceration determines much about the color, flavor, tannin content and aroma of the resulting wine.

        Fermentation: The process by which grape juice is transformed into wine through yeast cells that convert the sugars in the juice to alcohol and carbon dioxide. The initial application of heat controls the start and intensity of fermentation.

        Cold fermentation: This is fermentation of mainly white wines in temperature-controlled tanks, usually at around 13 to 16 degrees Celsius.

        Cold Stabilization: A process to remove tartrate cystals in wine. Temperatures are reduced to near freezing for up to 2 weeks. This causes the crystals to separate from the wine and cling to the sides of the holding vessel. The wine is then poured off leaving the tartrates behind.

        Heat Stabilization: The heating of wines to a high temperature allows the destruction of yeasts and bacteria and ensures biological stabilization (pasteurization) while preventing precipitates in the wine.

        Storage: The wine industry has long considered that a constant temperature between 55 °F and 60 °F (13.0 °C and 15.5 °C) is optimum for the storage and aging of wine.

Micro-Oxygenation Function

In addition to its ability to carefully regulate temperatures during the process of winemaking, the Fuji Electric PXG Wine also features the micro-oxygenation function.

Wines are typically held in barrels or tanks for a period of 12 to 24 months prior to bottling. During this time, a natural maturation of the wine occurs, as harsh young tannins soften and other complex changes take place.

The right amount of oxygen is vital in this maturation process. While excess oxygen can lead to premature ageing or spoilage, insufficient amounts can also be a problem. Wines can take a long time to develop, retaining under-ripe characters and lacking fullness and complexity.

The micro-oxygenation technique allows a controlled introduction of oxygen into the wine at precise levels, assisting the wine to breathe and develop at an optimum rate. Micro-oxygenated wines invariably show greater purity of fruit, enhanced palate structure, richness and more supple mouth-feel without in any way compromising their longevity.

Micro-oxygenation can help to:
- Improve structure and body
- Remove sulphide/reduced characters and remove tendency to reduction
- Stabilise colour/oxidative potential
- Reduce green, herbaceous characters
- Improve fruit profile

This technique is fully compatible with ultra-premium barrel maturation or oak alternatives. Micro-oxygenation provides the winemaker with control over oxygen uptake in wine in order to best manage its subtle and complex changes.
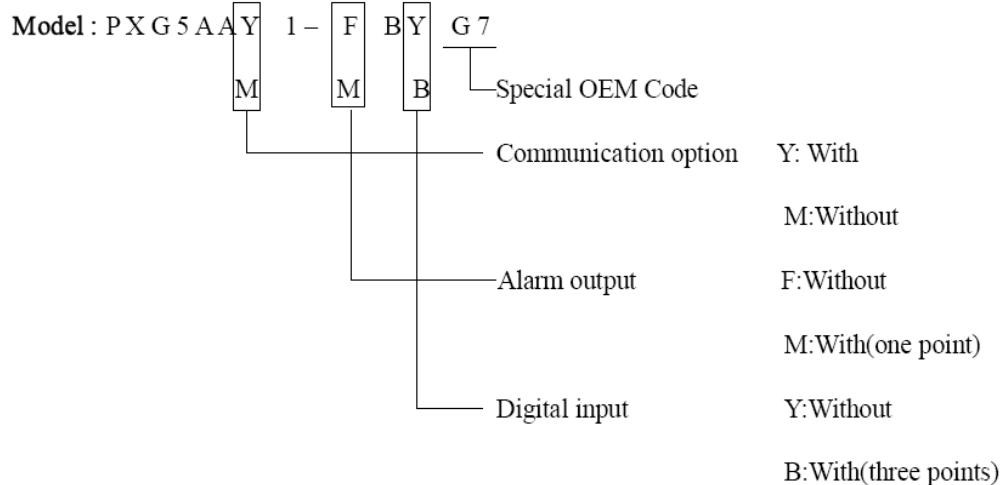
The Fuji Electric PXG Wine can control the micro-oxygenation process via a relay output able to activate the oxygenation valve. Additionally, the frequency and running time of the oxygenation can be adjusted on the controller.

Technical Specifications:

The Fuji Electric PXG Wine is base upon the popular PXG model and contains many of the same features and specifications.

1. Model code

[1]   Model code of the special specification for winery application is the following.

Model : P X G 5 A A Y   1 –   F   B Y   G 7
                        M   M   B

└── Special OEM Code

Communication option   Y: With

                         M:Without

Alarm output   F:Without

                         M:With(one point)

Digital input   Y:Without

                         B:With(three points)

2. Basic specification

Basic specification is same as standard type PXG.

- Input : Pt100,   range 0 to 150deg.C
- Front size   48 X 96mm
- Heat/Cool output : relay output
- Power supply : AC/DC 24V

Please refer to our catalogue for the details

3. Special specification (Software)
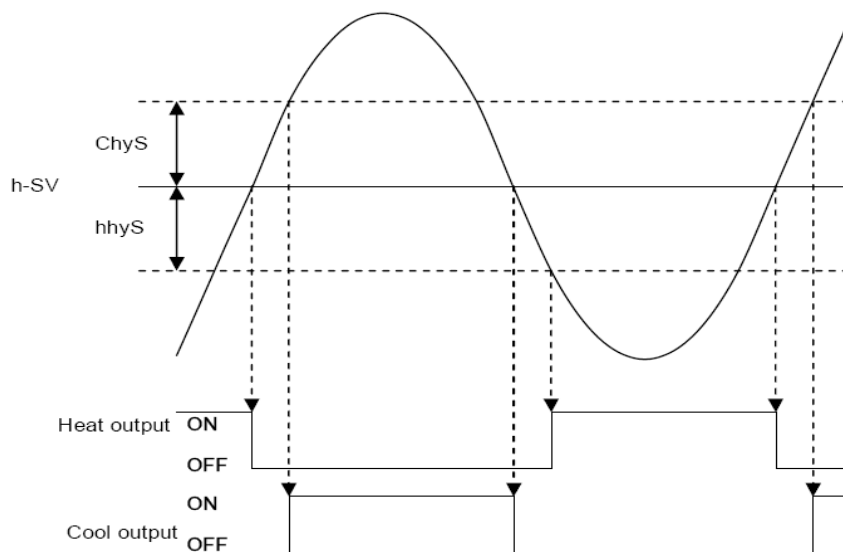
[1] Heat / Cool   ON/OFF control

Heat, Cool or Heat+Cool control can be selected by front key.

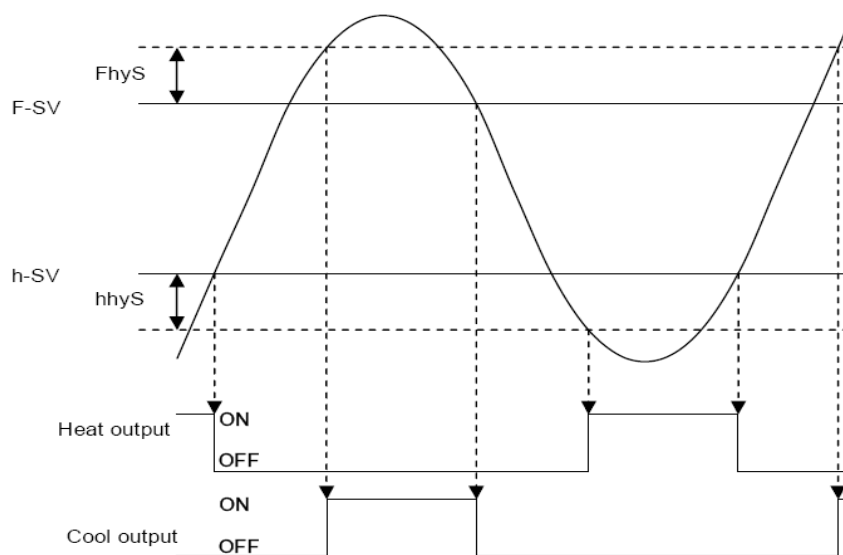Two types of Heat/Cool control are available.

Simple Set Value type or Double Set Value type of control can be selected by parameter (CFG ch.13   ModE)

Control pattern of the each mode is shown as below.

1) Simple Set Value type

2) Double Set Value type

[2] Remounting Function

Output for remounting control is allocated for Do1.
ON time, OFF time or Cycle time is set by parameters.

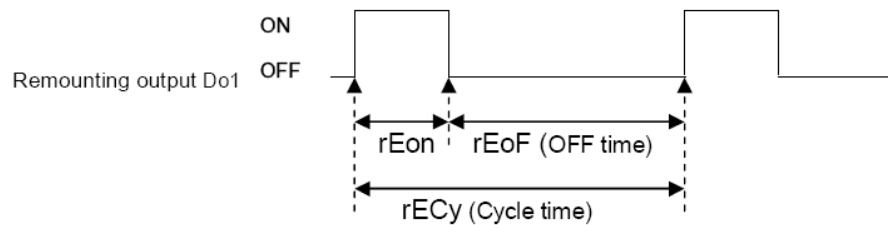<ON time and OFF time setting>
   rEon = on time [hh.mm]
   rEoF = off time [hh.mm] ($\neq 0$)
   rECy = 00.00

<Cycle time setting>
   rEon = on time [hh.mm]
   rEoF = 00.00
   rECy = cycle time [hh.mm] ($\neq 0$)

If "rEoF=0" and "rECy =0", Output becomes OFF.

[3] ON/OFF control of oxygen valve

Output for oxygen valve control is allocated for DO2.
ON time, OFF time or Cycle time is set by parameters.

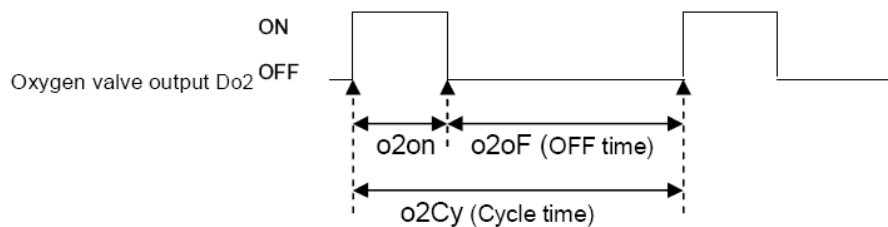<ON time and OFF time setting>
   o2on = on time [hh.mm]
   o2oF = off time [hh.mm] ($\neq 0$)
   o2Cy = 00.00

<Cycle time setting>
   o2on = on time [hh.mm]
   o2oF = 00.00
   o2Cy = cycle time [hh.mm] ($\neq 0$)

If "o2oF=0" and "o2Cy =0", Output becomes OFF

[4] Front face configuration

(1)Red LED   :   Heat control output ON/OFF(ON=lighting)
(2)Green LED   :   Cool control output ON/OFF(ON=lighting)
(3)R lamp   :   Remount control output ON/OFF(ON=lighting)
(4)M(Red) LED   :   Heat control mode
(5)M(Green) LED   :   Cool control mode
(6)PV right decimal point lamp: Remount control ON
(7)SV right decimal point lamp: Oxygen valve control ON
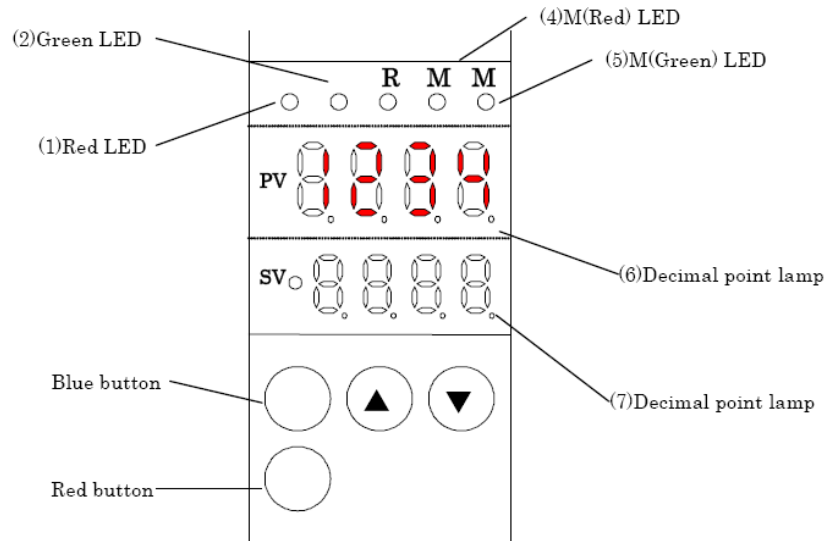
[5] SV display

(1) Simple Set Value type (Mode:0)   SV is displayed.
(2) Double Set Value type (Mode:1)
            Cool control mode   Cool SV (FSV) is displayed.
            Heat control mode   Heat SV(hSV) is displayed.
            Heat/Cool control mode   Cool SV （FSV） is displayed
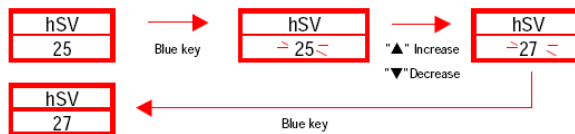   Heat/Cool control is OFF （No control）   "STby" is displayed.

"hSV" and "FSV" on the display can be set by "▲" and "▼" keys.

[6]　Front key operation

Red key: Press for 1sec　　　　　　　　　Heat control ON/OFF (toggle)

Blue key: Press for 1sec　　　　　　　　　Cool control ON/OFF (toggle)

Red + Blue+▲ key: Press for 2.5sec　　　Remounting control ON/OFF(toggle)

Red +　Blue +▼ key : Press for 2.5sec　　Oxygen valve control ON/OFF(toggle)

▲(UP) key: Increase parameter　　　　　Increase value of parameter when setting mode

▼(DOWN) key: Decrease parameter　　　Decrease value of parameter when setting mode

▲ + ▼ key : Press simultaneously　　　　To enter the parameters setting mode.

＜Key Operation＞

フロントキー操作

"PV"	25

"PV"	27

※2　"▲"increase　"▼"decrease

"▲"increase　"▼"decrease

No operation 3sec

"PV"	"SV" ※1

Red key 1sec→Heat ON/OFF
Blue 1 sec →Cool ON/OFF

"▲"+"▼" 1sec

"Red＋Blue＋▲"2.5sec→Remounting ON/OFF

"Red＋Blue＋▼"2.5sec→O₂ ON/OFF

No operation 30sec ⇒ PV/SV display

hSV	25	Heat SV

↑↓

FSV	15	Cool SV

↑↓

Éon	00.10	Remounting ON time

↑↓

Éof	00.10	Remounting OFF time

↑↓

ÉCy	00.00	Remounting Cycle time

↑↓

o2on	00.10	O₂ ON time

↑↓

o2oF	00.15	O₂ OFF time

↑↓

o2Cy	00.00	O₂ Cycle time

↑↓

PASS ※4	F1C0	Password

"▲"+"▼" 1sec　⋯　※3　⋯

OPE	ch.1

↑↓

:

CFG	ch.13	ch Displays

↑↓　"▲"+"▼" 1sec

hhyS	0.5	Heat hysteresis

↑↓

Fhys	0.5	Cool hysteresis

↑↓

ModE	0	Control mode

※1
ModE=0→ hSV
ModE= 1and　Heat controling →　hSV
ModE= 1and　Cool controling →　FSV
ModE= 1and　Heat/Cool controling →　FSV
ModE=1and　No control →　"STby" display

※2
"STby" is displayed →　Invalid

※3
Depending models,different parameters are displayed.

※4
Do not change setting.

Parameter modify

hSV	25

Blue key →

hSV	⁀25⁀

"▲" Increase　"▼"Decrease →

hSV	⁀27⁀

hSV	27

← Blue key

Block	Parameter	Meaning	DSP	Remarks
Monitoring	hSV	Heat SV (0 to 150 ℃)	dP28-bit5	
	FSV	Cool SV (0 to 150 ℃)	dP28-bit6	Not displayed when "ModE=0 "
	rEon	Remounting ON time	dP28-bit7	
	rEof	Remounting OFF time	dP28-bit8	
	rECy	Remounting cycle time	dP28-bit9	
	o2on	O_2 valve ON time (0 ∼ 99hour59min)	dP28-bit10	
	o2oF	O_2 valve OFF time (0 ∼ 99hour59min)	dP28-bit11	
	o2Cy	O_2 valve cycle time (0 ∼ 99hour59min)	dP28-bit12	
	PASS	Password	-	Do not change "F1C0"
CFG ch.13	hhyS	Hysteresis of heat control (0 ∼75 □)	dP26-bit11	
	FhyS	Hysteresis of cool control (0 ∼75 □)	dP26-bit12	
	ModE	0: Simple Set Value type 1: Double Set Value type	dP26-bit13	

Read/Write to the above parameters is possible through communication.

[8] Terminal allocation
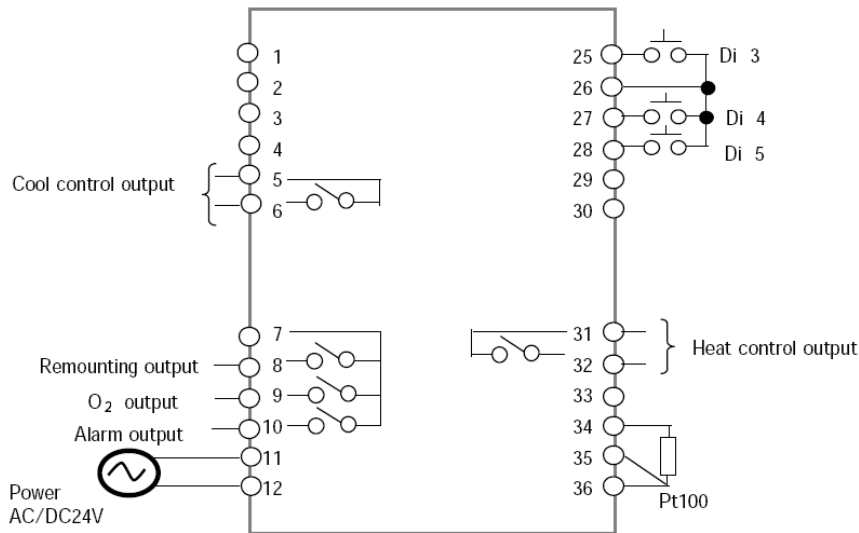
[9] Additional Di Functions

Heat, Cool, Remounting and Oxygen valve control ON/OFF settings are added to DI function.

Di code 53 :	Remounting control	ON/OFF
Di code 54 :	Oxygen valve control	ON/OFF
Di code 55 :	Heat control	ON/OFF
Di code 56 :	Cool control	ON/OFF

Each control can be ON/OFF by ON/OFF of DI input.