

LAMPIRAN

List Program Wonderware InTouch

Wonderware Windows Script

On show:

Relay1=0;	PB5=0;
Relay2=0;	LS1=0;
Relay3=0;	LS2=0;
IndikatorMerah=1;	SW1=0;
IndikatorHijau=0;	SW2=0;
IndikatorKuning=0;	SW3=0;
PB1=0;	LAMPUMERAH=0;
PB2=0;	LAMPUKUNING=0;
PB3=0;	LAMPUHIJAU=0;
PB4=0;	SR=0;
	PISTON=0;

While showing :

IF Relay1 == 1

THEN

PISTON = PISTON +1;

IndikatorMerah = 0;

IndikatorHijau = 1;

ENDIF;

IF Relay1 == 0

THEN

IndikatorMerah = 1;

IndikatorHijau = 0;

ENDIF;

IF Relay2 == 1

THEN

PISTON = PISTON -1;

IndikatorMerah = 0;

IndikatorHijau = 1;

ENDIF;

IF Relay3 == 1

THEN

IndikatorKuning = 1;

IndikatorMerah = 0;

IndikatorHijau = 0;

ENDIF;

IF PISTON == 4

THEN

PISTON =2;

ENDIF;

IF PISTON == -1

THEN

PISTON = 0;

ENDIF;

IF PB1 == 1

THEN

IndikatorKuning = 0;

IndikatorMerah = 1;

ENDIF;

1. Kepware Omron FINS Serial Addressing

OMRON FINS Serial CJ1 Addressing

The default data types for dynamically defined tags are shown in **bold** where appropriate.




Please see notes and restrictions below the table for [BCD Support](#), [String Support](#), [Array Support](#) and [Additional Notes](#).

Device Type	Range	Data Type	Access
Auxiliary Relay	A000-A447 A000-A446	Word , Short, BCD Long, DWord, LBCD, Float	Read Only
	A448-A959 A448-A958	Word , Short, BCD Long, DWord, LBCD, Float	Read/Write
	A000.00-A000.15-A447.00-A447.15	Boolean	Read Only
	A448.00-A448.15-A959.00-A959.15	Boolean	Read/Write
CIO	CIO0000-CIO6143 CIO0000-CIO6142 CIOxxxx.00-CIOxxxx.15	Word , Short, BCD Long, DWord, LBCD, Float Boolean	Read/Write
CIO Memory as string with HiLo byte order	CIO0000.256H-CIO6143.002H .l is string length, range 2 to 256 chars	String	Read/Write
CIO Memory as string with LoHi byte order	CIO0000.256L-CIO6143.002L .l is string length, range 2 to 256 chars	String	Read/Write
Counter	C0000-C4095	BCD , Word, Short	Read/Write
Counter Status	CS0000-CS4095	Boolean	Read/Write (See note)
Data Memory	D00000-D32767 D00000-D32766 Dxxxxx.00-Dxxxxx.15	Word , Short, BCD Long, DWord, LBCD, Float Boolean	Read/Write
	D00000.256H-D32767.002H .l is string length, range 2 to 256 chars	String	Read/Write
	D00000.256L-D32767.002L .l is string length, range 2 to 256 chars	String	Read/Write
Data Register	DR00-DR15	Word , Short, BCD	Read/Write

	DR00-DR14	Long, DWord, LBCD, Float	e (See note)
Expansion Data Memory (current bank)	E00000-E32767 E00000-E32766 Exxxxx.00-Exxxxx.15	Word , Short, BCD Long, DWord, LBCD, Float Boolean	Read/Write
Expansion Data Memory (current bank) as string with HiLo byte order	E00000.256H-E32767.002H .l is string length, range 2 to 256 chars	String	Read/Write
Expansion Data Memory (current bank) as string with LoHi byte order	E00000.256L-E32767.002L .l is string length, range 2 to 256 chars	String	Read/Write
Expansion Data Memory	E00:00000-E12:32767 E00:00000-E12:32766 Ex:x.00-Exx:xxxxx.15	Word , Short, BCD Long, DWord, LBCD, Float Boolean	Read/Write
Expansion Data Memory as string with HiLo byte order	E00:00000.256H -E12:32767.002H .l is string length, range 2 to 256 chars	String	Read/Write
Expansion Data Memory as string with LoHi byte order	E00:00000.256L -E12:32767.002L .l is string length, range 2 to 256 chars	String	Read/Write
Holding Relay	H0000-H1535 H0000-H1534 Hxxxx.00-Hxxxx.15	Word , Short, BCD Long, DWord, LBCD, Float Boolean	Read/Write
Index Register	IR00-IR15	DWord, Long, LBCD, Float	Read/Write (See note)
Task Flag	TK00-TK31	Boolean	Read Only
Timer	T0000-T4095	BCD , Word, Short	Read/Write
Timer Status	TS0000-TS4095	Boolean	Read/Write (See note)
Working Relay	W000-W511 W000-W510 Wxxx.00-Wxxx.15	Word , Short, BCD Long, DWord, LBCD, Float Boolean	Read/Write

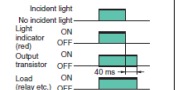
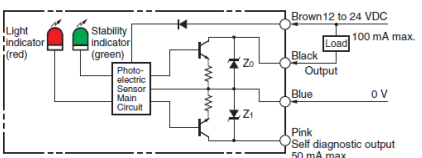
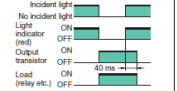
2. Photosensor Datasheet

Amplifier Units [Refer to Amplifier Units on page 15.]

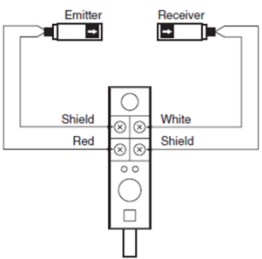
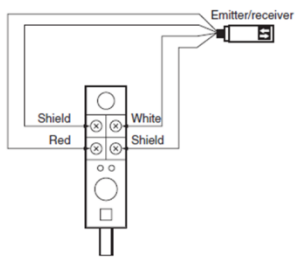
Power supply	Application	Appearance	Functions	Model
AC	Standard models		—	E3C-A
			Timer	E3C-C
DC	Slim type		Self diagnostic	E3C-JC4P 2M
	Small type		—	E3C-GE4

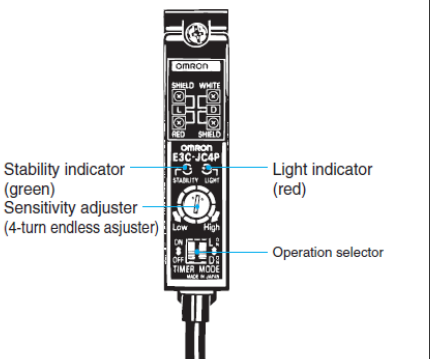
I/O Circuit Diagrams

NPN output

Model	Operation mode	Timing charts *	Operation selector	Output circuit
E3C-JC4P	Light-ON		L-ON (LIGHT ON)	
	Dark-ON		D-ON (DARK ON)	

Connection

Amplifier Units	Connected to the through-beam model	Connected to the reflective model	Note
E3C-JC4P			Note 1. The strip-off length of the shielded cable should always be 20 mm max. on the Receiver side (white) and 50 mm max. on the Emitter side (red).

Amplifier Units	Nomenclature	Settings
E3C-JC4P		---

Compact Head Amplifier-separated Photoelectric Sensor

E3C

CSM_E3C_DS_E_0_1

Thin, Compact Head Saves Space and Mounts Closely. Built-in Interference Protection Provided.

- Input indicator on the Sensor Unit simplifies settings.



Be sure to read *Safety Precautions* on page 11.

Ordering Information

Sensors

Sensor Units [Refer to *Dimensions* on page 12.]

Red light Infrared light

Sensing method	Application	Appearance	Sensing distance	Model	
Through-beam (Emitter + Receiver) *	Small type		100 mm	E3C-S10 2M Emitter E3C-S10L 2M Receiver E3C-S10D 2M	
			500 mm	E3C-S50 2M Emitter E3C-S50L 2M Receiver E3C-S50D 2M	
			1 m	E3C-1 2M Emitter E3C-1L 2M Receiver E3C-1D 2M	
			2 m	E3C-2 2M Emitter E3C-2L 2M Receiver E3C-2D 2M	
		Slim type		200 mm	E3C-S20W 2M Emitter E3C-S20LW 2M Receiver E3C-S20DW 2M
				300 mm	E3C-S30W 2M Emitter E3C-S30LW 2M Receiver E3C-S30DW 2M
	Side-view		300 mm	E3C-S30T 2M Emitter E3C-S30LT 2M Receiver E3C-S30DT 2M	
	Diffuse-reflective	Small type		100 mm	E3C-DS10 2M
		Slim type		50 mm	E3C-DS5W 2M
		Side-view		100 mm	E3C-DS10T 2M
Convergent-reflective	Small type		30±3 mm	E3C-LS3R 2M	

* Through-beam Sensors are normally sold in sets that include both the Emitter and Receiver. Orders for individual Emitters and Receivers are accepted. (Modifications are required for some models. Ask your OMRON representative for details.)

Ratings and Specifications

Sensors

Sensing method		Through-beam					
Item	Model	E3C-S10	E3C-S20W	E3C-S50	E3C-S30T E3C-S30W	E3C-1	E3C-2
Sensing distance		100 mm	200 mm	500 mm	300 mm	1 m	2 m
Standard sensing object		Opaque, 2-mm dia. min.		Opaque, 3-mm dia. min.	Opaque, 1.5-mm dia. min.	Opaque, 4-mm dia. min.	Opaque, 8-mm dia. min.
Directional angle		Emitter/Receiver: 10 to 60° each		Emitter/Receiver: 10 to 40° each		Emitter/Receiver: 3 to 20° each	Emitter/Receiver: 3 to 15° each
Light source (wavelength)		Infrared LED (950 nm)			Infrared LED (940 nm)	Infrared LED (950 nm)	
Ambient illuminance (Receiver side)		Incandescent lamp: 3,000 lx max., Sunlight 10,000 lx max.					
Ambient temperature range		Operating/Storage: -25°C to 70°C (with no icing or condensation)					
Ambient humidity range		Operating: 35% to 85%, Storage: 35% to 95% (with no condensation)					
Insulation resistance		20 MΩ min. at 500 VDC					
Dielectric strength		500 VAC at 50/60 Hz for 1 minute					
Vibration resistance		Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions					
Shock resistance		Destruction: 500 m/s ² for 3 times each in X, Y, and Z directions					
Degree of protection		IEC 60529 IP64 Limited to indoor use	IEC 60529 IP50 Limited to indoor use	IEC 60529 IP64 Limited to indoor use	IEC 60529 IP60 Limited to indoor use	IEC 60529 IP66 Limited to indoor use	
Connection method		Pre-wired models (standard length: 2 m)					
Weight (packed state)		Approx. 50 g			Approx. 24 g	Approx. 60 g	Approx. 120 g
Material	Case	Polycarbonate		ABS	Polycarbonate		Zinc die-cast
	Lens	Polycarbonate		Acrylics	Polycarbonate		
	Mounting Brackets	---				Steel	
Accessories	Instruction manual	Phillips screw M2×8, spring washer, flat washer, M2 nut, instruction manual	Instruction manual	Phillips screw M2×8, spring washer, flat washer, nut M2, instruction manual	Mounting Bracket (with screws), instruction manual	Mounting Bracket (with screws), instruction manual	

Sensing method		Diffuse-reflective			Convergent-reflective
Item	Model	E3C-DS5W	E3C-DS10T	E3C-DS10	E3C-LS3R
Sensing distance		50 mm (White paper 100 × 100 mm)	100 mm (White paper 100 × 100 mm)	100 mm (White paper 50 × 50 mm)	30 ± 3 mm (White paper 10 × 10 mm)
Differential travel		20% max. of sensing distance			±3% max.
Light source (wavelength)		Infrared LED (950 nm)	Infrared LED (950 nm)		Red LED (680 nm)
Ambient illuminance (Receiver side)		Incandescent lamp: 3,000 lx max., Sunlight 10,000 lx max.			
Ambient temperature range		Operating/Storage: -25°C to 70°C (with no icing or condensation)			
Ambient humidity range		Operating: 35% to 85%, Storage: 35% to 95% (with no condensation)			
Insulation resistance		20 MΩ min. at 500 VDC			
Dielectric strength		500 VAC at 50/60 Hz for 1 minute			
Vibration resistance		Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions			
Shock resistance		Destruction: 500 m/s ² for 3 times each in X, Y, and Z directions			
Degree of protection		IEC 60529 IP50 (Limited to indoor use)		IEC 60529 IP64 (Limited to indoor use)	
Connection method		Pre-wired models (standard length: 2 m)			
Weight (packed state)		Approx. 50 g			Approx. 55 g
Material	Case	Polycarbonate			
	Lens	Polycarbonate			
Accessories		Phillips screw M2×8, spring washer, flat washer, M2 nut, instruction manual	Instruction manual		

Amplifier Units

Item	Model	E3C-A	E3C-C	E3C-JC4P	E3C-GE4
Power supply voltage		100 to 240 VAC±10%, 50/60 Hz		12 to 24 VDC±10%, ripple (p-p): 1 V max.	
Power (current) consumption		3 W max.		50 mA max.	
Control output	Transistor output	Load power supply voltage: 24 VDC max., load current: 80 mA max., voltage output type, output current: 1 to 4 mA (residual voltage: 1.2 V max.) Light-ON/Dark-ON switch selectable		Load power supply voltage: 24 VDC max., load current: 100 mA max., NPN open collector output type (residual voltage: 1 V max.) Light-ON/Dark-ON switch selectable	Load power supply voltage: 24 VDC max., load current: 80 mA max., voltage output type, output current: 1 to 4 mA (residual voltage: 0.7 V max.) Light-ON/Dark-ON cable connection selectable
	Relay output	220 VAC 1 A cosφ=1 (resistive load) SPDT contact only		---	
External synchronous input		---	H = 6 to 30 V L = 0 to 2 V When L turns OFF the control output forcibly.	---	---
Timer function		---	ON/OFF, oneshot delay (selectable): 1 or 10 s max.	OFF-delay 0/40 ms (switch selectable)	---
Ambient temperature range		Operating: -10° to 55°C, Storage: -25° to 70°C (with no icing or condensation)			
Ambient humidity range		Operating: 35% to 85%, Storage: 35% to 95% (with no condensation)			
Insulation resistance		20 MΩ min. at 500 VDC			
Dielectric strength		500 VAC at 50/60 Hz for 1 minute			
Vibration resistance		Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions			
Shock resistance		Destruction: 300 ms ² three times in each of X, Y and Z directions			
Degree of protection		IEC IP20 (limited to indoor use)		IEC IP60 (limited to indoor use)	IEC IP20 (limited to indoor use)
Protection		Reverse polarity protection, output short-circuit protection, mutual interference prevention			
Response time	No contact	Operate or reset: 1 ms max./2 ms max. each (switch selectable)		Operate or reset: 1 ms max.	Operate or reset: 1 ms max./2 ms max. each (switch selectable)
	Relay	Operate or reset: 20 ms max.		---	
Connection method		Terminal block		Terminal block input cable pullout (standard cable length: 2 m)	Terminal block
Weight (packed state)		Approx. 200 g		Approx. 80 g	Approx. 15 g
Material	Case	ABS			Polycarbonate
	Mounting Brackets	Stainless steel	---	Iron	---
Accessories		Connection Socket (PF-113A) Instruction manual		Mounting Bracket, Adjustment screwdriver, Caution label, Instruction manual	Instruction manual

* The terminal pins are used for connection between amplifiers for synchronous operation.

LM393, LM293, LM2903, LM2903V, NCV2903, NCV2903V

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Power Supply Voltage	V_{CC}	+36 or ± 18	V
Input Differential Voltage	V_{IDR}	36	V
Input Common Mode Voltage Range (Note 1)	V_{ICR}	-0.3 to +36	V
Output Voltage	V_O	36	V
Output Short Circuit-to-Ground Output Sink Current (Note 2)	I_{SC} I_{Sink}	Continuous 20	mA
Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D $1/R_{\theta JA}$	570 5.7	mW mW/°C
Operating Ambient Temperature Range LM293 LM393 LM2903 LM2903V, NCV2903 (Note 3) NCV2903V (Note 3)	T_A	-25 to +85 0 to +70 -40 to +105 -40 to +125 -40 to +150	°C
Maximum Operating Junction Temperature LM393, 2903, LM2903V LM293, NCV2903	$T_{J(max)}$	150 150	°C
Storage Temperature Range	T_{stg}	-65 to +150	°C
ESD Protection at any Pin (Note 4) - Human Body Model - Machine Model	V_{ESD}	1500 150	V

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

- For supply voltages less than 36 V, the absolute maximum input voltage is equal to the supply voltage.
- The maximum output current may be as high as 20 mA, independent of the magnitude of V_{CC} , output short circuits to V_{CC} can cause excessive heating and eventual destruction.
- NCV2903 and NCV2903V are qualified for automotive use.
- V_{ESD} rating for NCV/SC devices is: Human Body Model - 2000 V; Machine Model - 200 V.

LM393, LM293, LM2903, LM2903V, NCV2903, NCV2903V

ELECTRICAL CHARACTERISTICS ($V_{CC} = 5.0 \text{ Vdc}$, $T_{low} \leq T_A \leq T_{high}$, unless otherwise noted.)

Characteristic	Symbol	LM293, LM393			LM2903, LM2903V, NCV2903, NCV2903V			Unit
		Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage (Note 6) $T_A = 25^\circ\text{C}$ $T_{low} \leq T_A \leq T_{high}$	V_{IO}	-	± 1.0	± 5.0	-	± 2.0	± 7.0	mV
Input Offset Current $T_A = 25^\circ\text{C}$ $T_{low} \leq T_A \leq T_{high}$	I_{IO}	-	± 5.0	± 50	-	± 5.0	± 50	nA
Input Bias Current (Note 7) $T_A = 25^\circ\text{C}$ $T_{low} \leq T_A \leq T_{high}$	I_{IB}	-	20	250	-	20	250	nA
Input Common Mode Voltage Range (Note 7) $T_A = 25^\circ\text{C}$ $T_{low} \leq T_A \leq T_{high}$	V_{ICR}	0	-	$V_{CC} - 1.5$	0	-	$V_{CC} - 1.5$	V
Voltage Gain $R_L \geq 15 \text{ k}\Omega$, $V_{CC} = 15 \text{ Vdc}$, $T_A = 25^\circ\text{C}$	A_{VOL}	50	200	-	25	200	-	V/mV
Large Signal Response Time $V_{in} = \text{TTL Logic Swing}$, $V_{ref} = 1.4 \text{ Vdc}$ $V_{RL} = 5.0 \text{ Vdc}$, $R_L = 5.1 \text{ k}\Omega$, $T_A = 25^\circ\text{C}$	-	-	300	-	-	300	-	ns
Response Time (Note 9) $V_{RL} = 5.0 \text{ Vdc}$, $R_L = 5.1 \text{ k}\Omega$, $T_A = 25^\circ\text{C}$	t_{TLH}	-	1.3	-	-	1.5	-	μs
Input Differential Voltage (Note 10) All $V_{in} \geq \text{GND}$ or V^- Supply (if used)	V_{ID}	-	-	V_{CC}	-	-	V_{CC}	V
Output Sink Current $V_{in} \geq 1.0 \text{ Vdc}$, $V_{in+} = 0 \text{ Vdc}$, $V_O \leq 1.5 \text{ Vdc}$, $T_A = 25^\circ\text{C}$	I_{SINK}	6.0	16	-	6.0	16	-	mA
Output Saturation Voltage $V_{in} \geq 1.0 \text{ Vdc}$, $V_{in+} = 0$, $I_{SINK} \leq 4.0 \text{ mA}$, $T_A = 25^\circ\text{C}$ $T_{low} \leq T_A \leq T_{high}$	V_{OL}	-	150	400	-	-	400	mV
Output Leakage Current $V_{in-} = 0 \text{ V}$, $V_{in+} \geq 1.0 \text{ Vdc}$, $V_O = 5.0 \text{ Vdc}$, $T_A = 25^\circ\text{C}$ $V_{in-} = 0 \text{ V}$, $V_{in+} \geq 1.0 \text{ Vdc}$, $V_O = 30 \text{ Vdc}$, $T_{low} \leq T_A \leq T_{high}$	I_{OL}	-	0.1	-	-	0.1	-	nA
Supply Current $R_L = \infty$ Both Comparators, $T_A = 25^\circ\text{C}$ $R_L = \infty$ Both Comparators, $V_{CC} = 30 \text{ V}$	I_{CC}	-	0.4	1.0	-	0.4	1.0	mA

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

LM293 $T_{low} = -25^\circ\text{C}$, $T_{high} = +85^\circ\text{C}$

LM393 $T_{low} = 0^\circ\text{C}$, $T_{high} = +70^\circ\text{C}$

LM2903 $T_{low} = -40^\circ\text{C}$, $T_{high} = +105^\circ\text{C}$

LM2903V & NCV2903 $T_{low} = -40^\circ\text{C}$, $T_{high} = +125^\circ\text{C}$

NCV2903V $T_{low} = -40^\circ\text{C}$, $T_{high} = +150^\circ\text{C}$

NCV2903 and NCV2903V are qualified for automotive use.

- The maximum output current may be as high as 20 mA, independent of the magnitude of V_{CC} , output short circuits to V_{CC} can cause excessive heating and eventual destruction.
- At output switch point, $V_O = 1.4 \text{ Vdc}$, $R_S = 0 \Omega$ with V_{CC} from 5.0 Vdc to 30 Vdc, and over the full input common mode range (0 V to $V_{CC} - 1.5 \text{ V}$).
- Due to the PNP transistor inputs, bias current will flow out of the inputs. This current is essentially constant, independent of the output state, therefore, no loading changes will exist on the input lines.
- Input common mode of either input should not be permitted to go more than 0.3 V negative of ground or minus supply. The upper limit of common mode range is $V_{CC} - 1.5 \text{ V}$.
- Response time is specified with a 100 mV step and 5.0 mV of overdrive. With larger magnitudes of overdrive faster response times are obtainable.
- The comparator will exhibit proper output state if one of the inputs becomes greater than V_{CC} , the other input must remain within the common mode range. The low input state must not be less than -0.3 V of ground or minus supply.