Specifications

SUPPLY VOLTAGE
- 12 to 24 VDC
- Polarity Protected
- Intended for use in Class 2 circuits

CURRENT REQUIREMENTS
- CW-1: 110mA@12VDC, 80mA@24VDC
- CW-2: 140mA@12VDC, 85mA@24VDC

PERFORMANCE
- CW-1: Effective Resolution:
  Min. 12 bit, Max. 16 bit
- CW-2: Effective Resolution: 14 bit

OPTICAL CHARACTERISTICS
- Light emitter: White LED
- Optical axis: CW-1: Coaxial;
  CW-2: Convergent
- Receiving spectrum: 400nm to 700nm

DIGITAL OUTPUTS
- Four (4) selectable NPN or PNP open collector outputs
- 75 mA capacity
- Short circuit & transient voltage protected
- Residual voltage:
  NPN, 1.35 max.; PNP, 2.05 max.

ANALOG OUTPUTS
- Three outputs: Selectable as XYZ for color differentiation (RGB equivalent) or xyY for color + intensity differentiation
- 0-5 VDC +/-1%
- 10 bit resolution
- Max load per channel: 2k OHMS
- Transient Suppression

OUTPUT SELECTION
- LO (Light On or Color Match)
- DO (Dark On or No-Match)
- Mute (Channel Off)

REMOTE CAPTURE INPUT
- Input time: 25mS (ON) / 25mS (OFF) minimum
- Selectable (sinking or sourcing)
- Contact or solid-state input 1mA
- Transient suppression

GATE/LATCH INPUT
- Selectable NPN/Sinking or PNP/Sourcing
- Selectable EDGE or GATE trigger for latch reset or inhibit for windowing
- Contact or solid-state input 1mA
- Transient suppression

TIMER
- On delay, off delay, one shot, and latch
- Duration: 1mS to 10 seconds +/-1%

DETECTION MODE
- Color or color + intensity

ALPHA NUMERIC DISPLAY
- 4-Channel Color Monitor for "At-A-Glance" Performance Feedback
- Alpha-Numeric Display for Available Options

RESPONSE TIME
- Color-to-color: CW-1: 75μs (Uspd), 150μs (Hspd), and 300μs (Hres); CW-2: 600μs
- Shade-to-shade: CW-1: 100μs (Uspd), 200μs (Hspd), and 800μs (Hres); CW-2: 800μs

DIAGNOSTIC INDICATORS
- Output Indicator – (Amber) CH 1 through CH 4
- Four Character Alpha-Numeric Display – (Green)

AMBIENT LIGHT IMMUNITY
- Responds to sensor's pulsed modulated light source – immune to most ambient light including indirect sunlight

HUMAN INTERFACE
- Pushbutton control: Select, Next

AMBIENT TEMPERATURE
- -5°C to 55°C (23°F to 131°F) No ice, frost, or fogging allowed

STORAGE TEMPERATURE
- 5°C to 90°C (41°F to 104°F)

RELATIVE HUMIDITY
- 35% to 85%

VIBRATION
- 10 to 55 Hz, 0.5 mm, 30 minutes each axis

SHOCK
- Half-sine wave, 30g, 11μs 6 time 3 axis

CERTIFICATIONS
- CE - Complies with IEC 60947-5-2 edition 3.0 2007-10
- UL & CUL listed; CCN NRKH & NRKH7

LENS MATERIAL
- Acrylic or glass

RUGGED CONSTRUCTION
- Chemical resistant, high impact polycarbonate housing
- Waterproof ratings: NEMA 4, IP65.

CE c UL us
RoHS Compliant
Product subject to change without notice.

Connections and Dimensions

SMARTEYE® ColorWise™

POS — Brown
CH 1 — Black
CH 2 — White
REMOTE CAPTURE — Pink
GATE — Violet
CH 3 — Gray
CH 4 — Orange
NEG — Blue
ANALOG X — Red/White
ANALOG Y — Green/White
ANALOG Z — Blue/White
N/C — Green/Black
N/C — Red/Black
N/C — Pink/Black

12 TO 24 VDC

(1) NPN (SINKING) OUTPUT LOAD TERMINATED TO POSITIVE
PNP (SOURCING) OUTPUT LOAD TERMINATED TO NEGATIVE

(2) NPN (SINKING) INPUT ACTIVATED BY CONNECTING TO NEGATIVE
PNP (SOURCING) INPUT ACTIVATED BY CONNECTING TO POSITIVE

For connector versions use:
BCC-6 - 6 ft. 14 Wire Cable with ¼ Turn Locking Connector

SEB-4 Mounting Bracket with Hardware

Rear Door Made of Smoked Clear Polycarbonate Plastic
2X Side Label Area
Extended 22° Window Is Exclusive To Short Range ColorWise Models
6' Cable For Cabled Models

2.392 CW x-1x (Short Range)
2.184 CW x-2x (Long Range)
2.234 CW x-2x (Long Range)
2.442 CW x-1x (Short Range)
0.900
2.556
2.056
0.250
0.250

15°
2.055" (52.2 mm)
3.857" (100.4 mm)
1.000" (25.4 mm)
1.500" (38.1 mm)
0.625" (15.9 mm)
1.000" (25.4 mm)
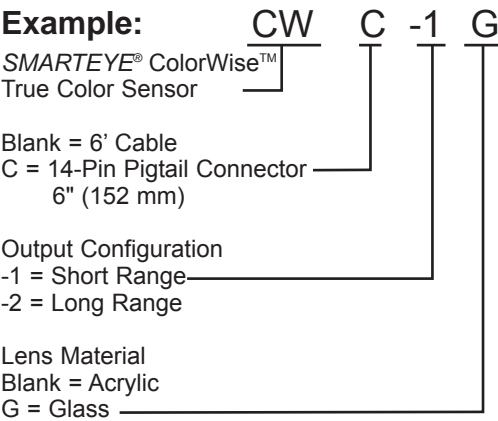
CE c UL us

070-0199

The **SMARTEYE® COLORWISE™ *True Color Sensor*** is the most feature packed color sensor available. Designed to work as well as an instrument or spectrometer, this sensor can solve the most difficult color applications at higher speeds than color cameras or the closest priced competitive product. The 4 Channel Monitor provides a visual confirmation of performance without having to switch channel selections or touch the sensor in any way. Providing a choice in speed versus resolution, the **COLORWISE™ *True Color Sensor*** puts the controls of the performance of the sensor in the hands of the operator; allowing for more application solutions, and removing the limits that either speed or resolution alone can offer. With control over Tolerance, Light Intensity, Output Configuration (NPN or PNP), Timers, Input Configuration (Edge or Gate), the **COLORWISE™** provides a tailored and customized solution for the most difficult color sorting, or inspection problems facing today's packaging and production lines.

The **COLORWISE™** also comes equipped with 4 digital and 3 analog outputs that not only help to sort products by color, but can determine specific color signatures as well.

The **SMARTEYE® COLORWISE™ *True Color Sensor*** from Tri-Tronics®: *the Wisest choice you can make!*
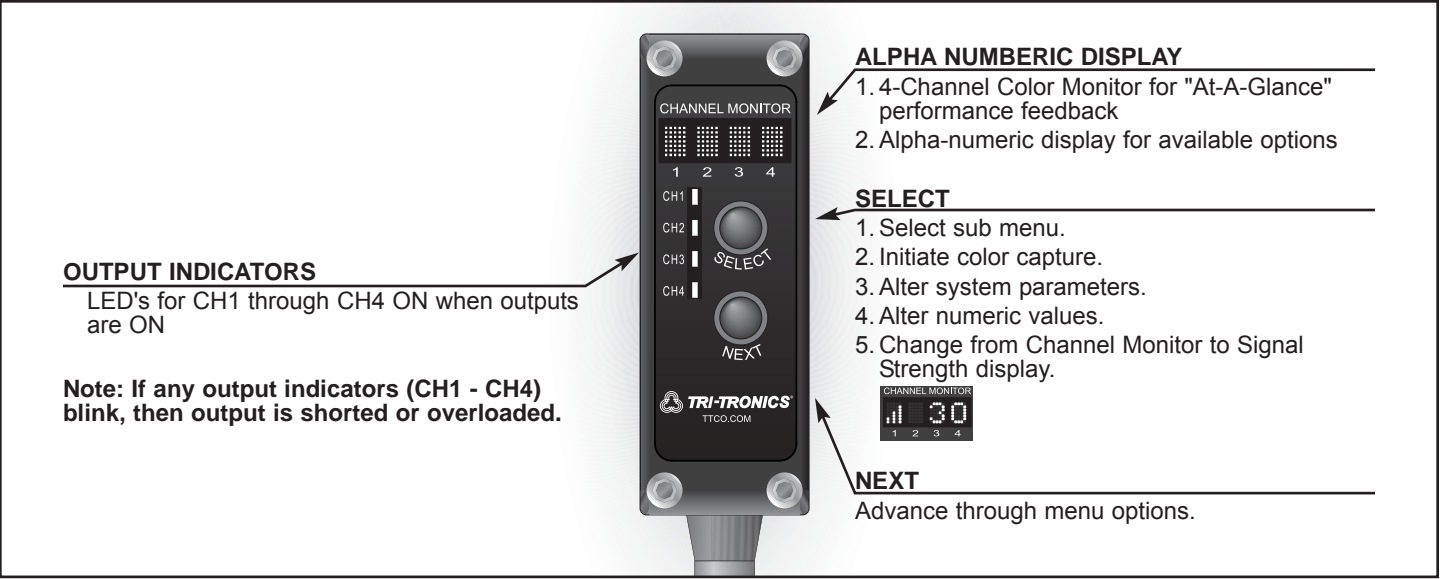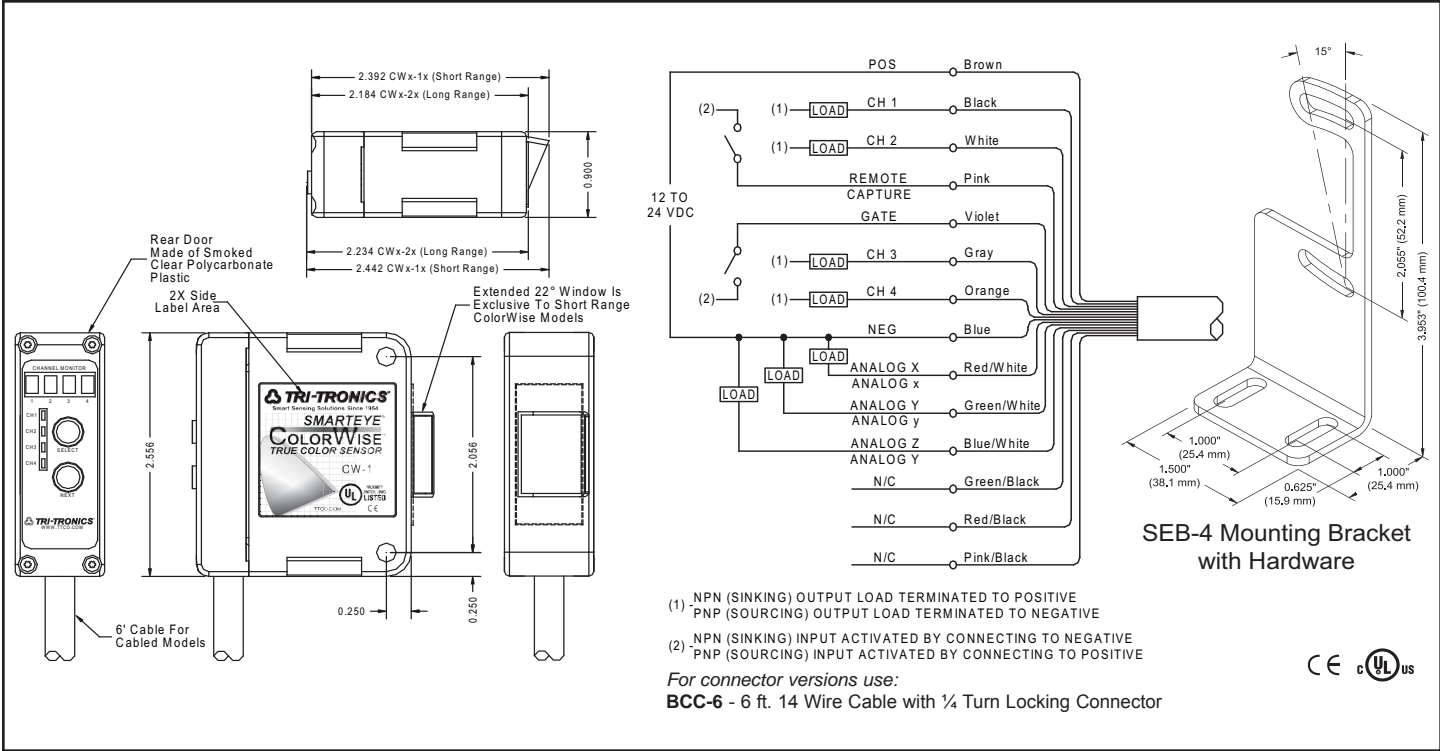
How to Specify

1. **Select Sensor:**
SMARTEYE® ColorWise™ True Color Sensor

2. **Select Cable:**
Blank = 6 foot, 14 conductor, 28AWG Cable
C = 6 inch pigtail with 14-pin, 1/4-turn locking connector

3. **Select Range:**
-1 = Short Range
-2 = Long Range

4. **Select Lens Material:**
Blank = Acrylic
G = Glass

Example: CW   C   -1   G

SMARTEYE® ColorWise™ True Color Sensor

Blank = 6' Cable
C = 14-Pin Pigtail Connector 6" (152 mm)

Output Configuration
-1 = Short Range
-2 = Long Range

Lens Material
Blank = Acrylic
G = Glass

ALPHA NUMERIC DISPLAY
1. 4-Channel Color Monitor for "At-A-Glance" performance feedback
2. Alpha-numeric display for available options

OUTPUT INDICATORS
LED's for CH1 through CH4 ON when outputs are ON

Note: If any output indicators (CH1 - CH4) blink, then output is shorted or overloaded.

SELECT
1. Select sub menu.
2. Initiate color capture.
3. Alter system parameters.
4. Alter numeric values.
5. Change from Channel Monitor to Signal Strength display.

NEXT
Advance through menu options.

CHANNEL MONITOR
CH1 CH2 CH3 CH4
SELECT
NEXT

TRI-TRONICS®
P.O. BOX 25135, TAMPA, FL 33622-5135
813-886-4000 / 800-237-0946
ttco.com / info@ttco.com

Setup Instructions

Channel Monitor*

PRESS SELECT (TOGGLES)

The Channel Monitor indicates color match quality as follows:

Full Bars = Perfect color match

At Least One Bar = Color inside tolerance

No Bars = Outside of tolerance; no match.

Returned light level too low. Reposition sensor or adjust Light Intensity.

Returned light level too high. Reposition sensor or adjust Light Intensity.

X = Muted Channel Monitor and output.

Pressing NEXT will advance through each channel followed by the system menu.

`CH1>` → PRESS NEXT → `CH2>` → PRESS NEXT → `CH3>` → PRESS NEXT → `CH4>` → PRESS NEXT → `SYS>`

See next page for System Parameters.

In channels 1-4, press SELECT to advance to detailed setup for each channel.

Signal Strength

* FACTORY DEFAULT SETTING

The Signal Strength display indicates total signal strength as a number from 0 (low) to 100 (high). This is a useful setup tool for sensor positioning.

`0` — Adjust Signal Strength by repositioning the sensor, or adjusting Light Intensity, "L", in System Parameters.

`100` — The higher the Signal Strength, the better the color detection.

`- - -` — Signal Strength, returned light level, too low. Reposition sensor or adjust Light Intensity.

`+ + +` — Signal Strength, returned light level, too high. Reposition sensor or adjust Light Intensity.

1 Capture Color
`CAPT`

PRESS / NEXT
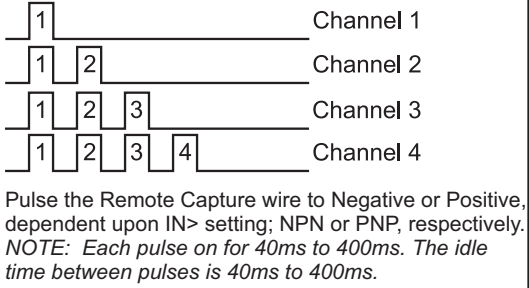
Aim the sensor at the desired color and press SELECT to capture color.
If display flashes "HIGH" or "LOW" this indicates an out of range condition.

2 Tolerance
`T:01` Through `T:50` `T:10`*

PRESS / NEXT

Fine tune tolerance by pressing/holding SELECT (1-50). The lower the number the greater the sensitivity.

3 Color / Color + Intensity Mode
`M:C`* `M:CI`

PRESS / NEXT

Pressing SELECT toggles between Color (C) and Color + Intensity (CI) mode. Color + Intensity is used for shade-to-shade applications.

4 Output Mode
`LO`* `DO` `Mute`

PRESS / NEXT

Pressing SELECT toggles LO (Light On or Color Match); DO (Dark On or No Match); MUTE (Disable Channel Monitor and Output).

5 Timer Mode
`Toff`* `OffD` `OnD` `Shot` `Ltch`

PRESS / NEXT

Pressing SELECT changes timer mode: Timer off (Toff), Off Delay (OffD), On Delay (OnD), One Shot (Shot), and Latch (Ltch).

Press Next

Adjust Time (ms)
`0001` Through `9999`

Pressing/holding SELECT increases timer in milliseconds.
Note: Only displayed when timer is enabled.

Range and Spot Size

Short Range – CW-1		Long Range – CW-2	
Distance (Min to Max Range)	**Spot Size** (Circular)	**Distance** (Min to Max Range)	**Spot Size** (Square)
10mm/.394"	5.00mm/0.197"	51mm/2"	19.1mm/0.752"
15mm/.590"	4.75mm/0.187"	154mm/6"	31.8mm/1.252"
20mm/.787"	5.75mm/0.226"	254mm/10"	41.3mm/1.624"
25mm/.984"	7.75mm/0.305"	305mm/12"	47.6mm/1.874"
		406mm/16"	60.3mm/2.374"

Remote Capture

Channel 1
Channel 2
Channel 3
Channel 4

Pulse the Remote Capture wire to Negative or Positive, dependent upon IN> setting; NPN or PNP, respectively.
NOTE: Each pulse on for 40ms to 400ms. The idle time between pulses is 40ms to 400ms.
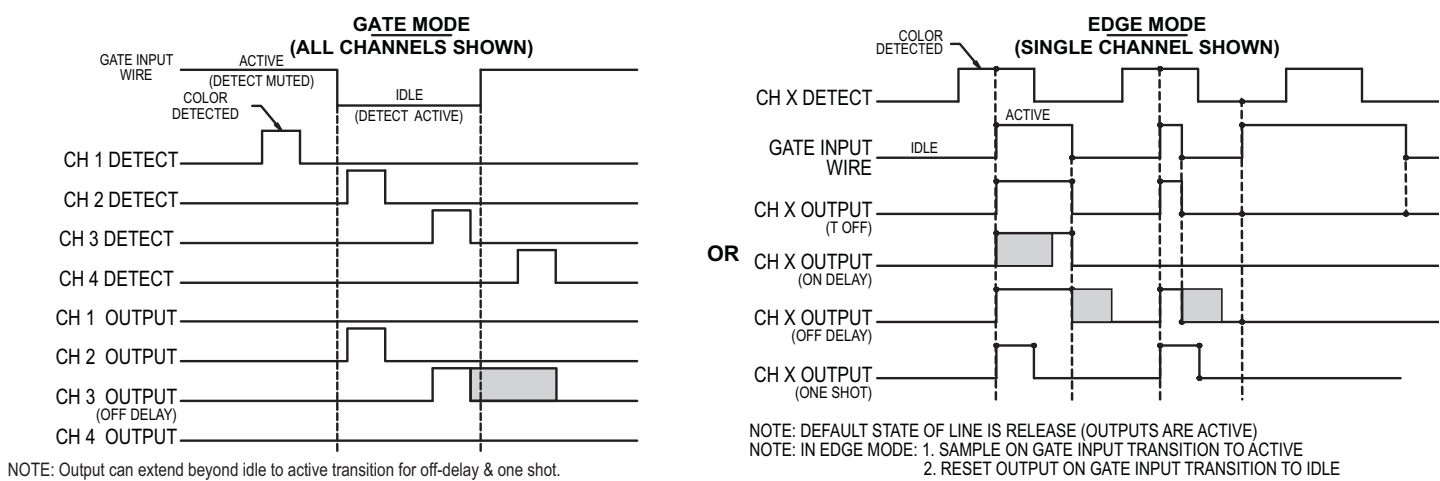

System Parameters

Press SELECT to enter System Parameters menu.
Note: System Parameters changes will affect all channels.

`SYS>`

1 Unlock / Lock
`ULOC`* `LOCK`

PRESS / NEXT

Pressing SELECT enables and disables button Lockout (ULOC, LOCK).

2 Light Intensity (Emitter)
`L:10` Through `L:100`*

PRESS / NEXT

Pressing SELECT increases intensity (10-100).

3 Response Time *(CW-1 models only)*
`HSpd` `USpd` `HRes`

PRESS / NEXT

Pressing SELECT changes: 75µs Ultra High Speed(Uspd), 150µs High Speed (Hspd), and 300µs High Resolution (Hres). See specs on page 4 for details.

4 Adjust Input
`IN>` Press SELECT to adjust Input.

PRESS / NEXT

4a Gate/Edge
`Gate`* `Edge`

Pressing SELECT switches between Gate and Edge mode. *Note: Edge is a momentary trigger; gate is a window trigger or inhibit/reset.*

4b NPN/PNP Input
`NPN`* `PNP`

Pressing SELECT switches gate and remote set inputs to sinking (NPN) or sourcing (PNP).
Note: Sensor resets after a change.

5 Adjust Output
`OUT>` Press SELECT to adjust Output.

5a
`1:NPN`* → `2:NPN`* → `3:NPN`* → `4:NPN`* → `XYZ`*

• Press NEXT to scroll through digital channels and analog output.
• Press SELECT to alter outputs: NPN to PNP for digital channels 1 through 4; and XYZ to xyY on analog output.
Note: Do not change IN> or OUT> selections while connected to input device or damage may occur to input device.

GATE INPUT FUNCTIONALITY - LATCH DISABLED
GATE MODE OR EDGE MODE SET IN SYSTEM MENU

GATE MODE (ALL CHANNELS SHOWN)

GATE INPUT WIRE — ACTIVE (DETECT MUTED) — COLOR DETECTED — IDLE (DETECT ACTIVE)

CH 1 DETECT
CH 2 DETECT
CH 3 DETECT
CH 4 DETECT
CH 1 OUTPUT
CH 2 OUTPUT
CH 3 OUTPUT (OFF DELAY)
CH 4 OUTPUT

NOTE: Output can extend beyond idle to active transition for off-delay & one shot.

OR

EDGE MODE (SINGLE CHANNEL SHOWN)

COLOR DETECTED
CH X DETECT — ACTIVE
GATE INPUT WIRE — IDLE
CH X OUTPUT (T OFF)
CH X OUTPUT (ON DELAY)
CH X OUTPUT (OFF DELAY)
CH X OUTPUT (ONE SHOT)

NOTE: DEFAULT STATE OF LINE IS RELEASE (OUTPUTS ARE ACTIVE)
NOTE: IN EDGE MODE: 1. SAMPLE ON GATE INPUT TRANSITION TO ACTIVE
2. RESET OUTPUT ON GATE INPUT TRANSITION TO IDLE

GATE INPUT FUNCTIONALITY - LATCH ENABLED
GATE MODE OR EDGE MODE SET IN SYSTEM MENU

GATE MODE (ALL CHANNELS SHOWN)

GATE INPUT WIRE — ACTIVE (DETECT MUTED) — COLOR DETECTED — IDLE (DETECT ACTIVE)

CH 1 DETECT
CH 2 DETECT
CH 3 DETECT
CH 4 DETECT
CH 1 OUTPUT
CH 2 OUTPUT (NOTE: LATCH TURNED ON)
CH 3 OUTPUT
CH 4 OUTPUT

OR

EDGE MODE (SINGLE CHANNEL SHOWN)

COLOR DETECTED
CH X DETECT — ACTIVE
GATE INPUT WIRE — IDLE
CH X OUTPUT (LATCH)

NOTE: DEFAULT STATE OF LINE IS RELEASE (OUTPUTS ARE ACTIVE)