

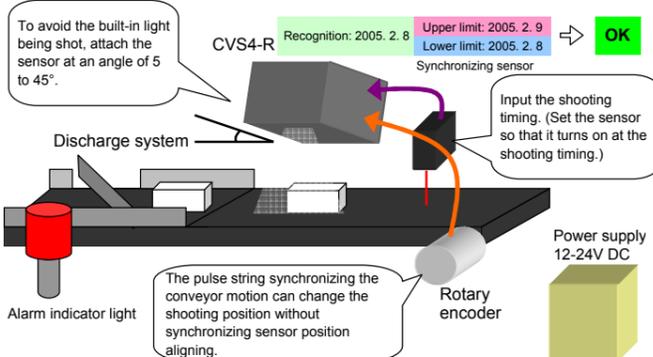
OCR Sensor (Optical Character Recognition) **CVS4-R** **OPTEX F.A.**
Instruction Manual

* Thank you for purchasing our OCR Sensor (Optical Character Recognition) CVS4-R series.
 * Carefully read this manual for proper operation before use.
 * Keep this manual handy for future reference.
 * This product is not designed as a safety device to protect human body.

1 Before use

What is CVS4-R Series?

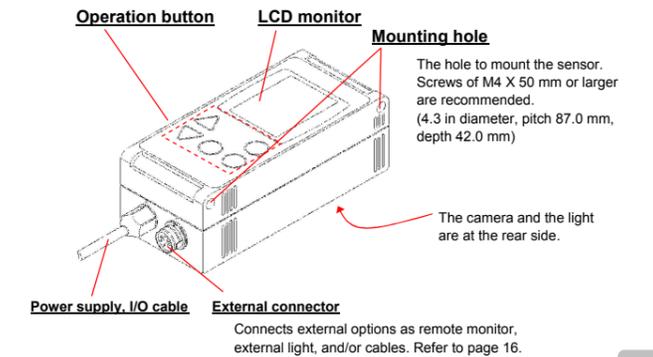
The CVS4-R series converts the date and time such as an expiration date from the screen to the strings and output OK if they are within the upper and lower limit of setting date and time. The date and time are updated by the built-in calendar. In addition, the string of alphabetical and numerical characters can be identified.



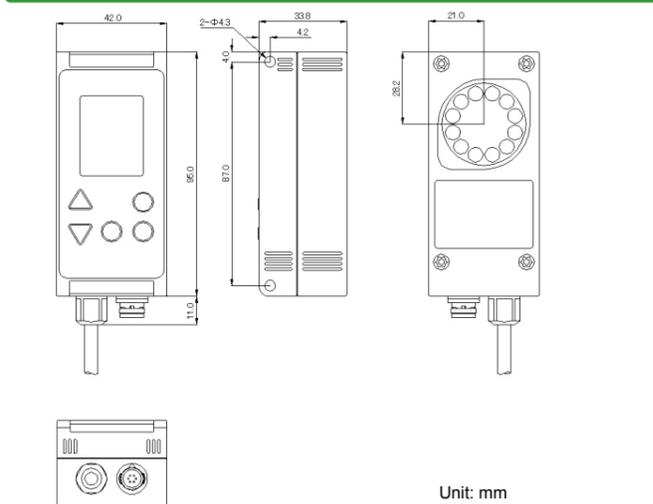
Specification

Model	CVS4-N20W-R	CVS4-N21W-R	CVS4-N23W-R	CVS4-N23RW-R	CVS4-N40W-R
Angle of view	CVS4-P20W-R	CVS4-P21W-R	CVS4-P23W-R	R	CVS4-P40W-R
Shooting distance, range	Refer to page 3.				
Light source	White LED (12 pcs)				
Brightness	Approx. 108 cd	Approx. 54 cd	Approx. 108 cd	Approx. 54cd	
Image sensor	330,000 pixels, CMOS black and white image sensor				
Supply voltage	12 to 24 V DC ± 10 %				
Power consumption	Max. 140 mA / 24 V DC				
Resolution	512 X 244		244 X 512		512 X 244
Lifetime of light source	Approx. 100,000 hours* (In normal temperature and humidity. Brightness level down by 1/2 of the initial level)				
Built-in clock accuracy	Monthly difference: -45 sec to + 1min 15 sec (Representative value)				
Built-in clock Backup	Primary battery: 5 years with the power OFF (Representative value) Supercapacitor: 7.8 years (Representative value with 3 days of backup time)				
Response time	20 characters of the date in 2 rows Approx. 23 to 48 ms (Rotation correction 0 to ±10°)				
Output signal	NPN/PNP Open collector output: 2, max. 100 mA, Residual voltage 1.0 V or less, OK/NG output, External light control				
Input signal	Bank selection, String addition, External teaching, Synchronism, Pulse train				
Input filter time	12 ms (max); Bank selection, String addition, External teaching input, 48 μs (turn on, max), 450 μs (turn off); Synchronism, Pulse train input				
Operation temperature/humidity	0 to 40°C (No condensation), 35 to 85 %/RH				
Storage temperature/humidity	-20 to 70°C, 25 to 95 %/RH				
Vibration and impact durability	10 to 55 Hz Amplitude 1.5 mm, 50G (X, Y, Z 3 times)				
Housing material	ABS / Acrylic / Polycarbonate				
Protection class	IP67				
Weight	Approx. 200 g				
Recognized number of characters, rows	60 characters (All rows) / 6 rows				
Recognized number of dates, times, and strings	4 in total: Each 2 for the date and the time, below 4 for the string (total 22 characters)				
User-defined dictionary	56 characters (Transferred from the PC)				
Date and time in letters	Month: 1 chr., Date: 2 chr., Hour: 1 chr., Minute: 1 chr. Converting to the above-mentioned alphabetical and numeric characters is available. (Transferred from the PC)				
Communication	RS232C (TTL Level) 4800 to 115200 bps				

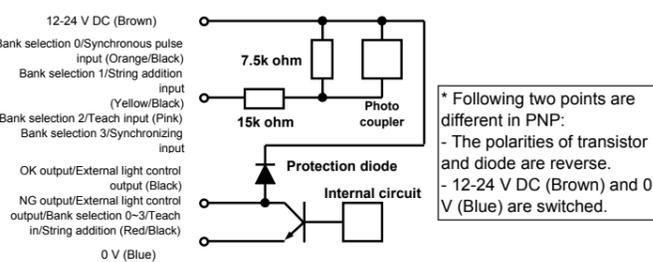
Part Names and Functions



Dimension Drawing



I/O Circuit



Bank Selection Table

Bank	Parameter (1.Parameter)				Line color				Selectable range
	Synchron	String +	SyncPuls	Others	Orange/Black	Yellow/Black	Pink	Purple	
BKIN	CONT	OFF	Others ON	Bank selection 0	Bank slctn1	Bank selection 2	Bank selection 3	0 to 15	
	UP, HIGH, DOWN, LOW	ON, SCLR	Others ON	Pulse train	String +	***1	Synchronizing input	0, 1, 4, 5, 8, 9, 12, 13	
TCH	CONT	OFF	Others ON	Bank selection 0	Bank slctn1	Bank selection 3	Bank selection 3	0 to 3, 8 to 11	
	UP, HIGH, DOWN, LOW	ON, SCLR	Others ON	Pulse train	String +	External Teaching ***1	Synchronizing input	0 to 3, 0.2, 0.1, 4, 5, 0	
0 to 15, COMM	CONT	OFF	Others ON	Invalid	Invalid	Invalid	Invalid	0 to 15 (Switches with the setting value)	
	UP, HIGH, DOWN, LOW	ON, SCLR	Others ON	Pulse train	String +	Invalid	Synchronizing input	COMM. Sets with communication	

***1 In the case setting value of String+ is SET0, the rose wire has function that sets number symbols in B.String to "0". And selecting bank number 4 to 7 and 12 to 15 is unavailable.

External teaching input
 Performs 7.Semiauto at rising. (Possible to specify 6.AutoTeach)

String + input
 The last digit of string registered at rising will be the character of the next ASCII code. However, the numerical characters repeat from 0 to 9 and the alphabetical characters repeat from A to Z. When 9 turns to 0, or Z to A, the next left character will be the next ASCII code. (Clears all character string when String+ is SCLR.)

Bank selection input
 The duration from input to the actual switch is approx. 30 ms, but it takes approx. 100 ms to accept the next shooting.

Pulse train input
 Counts at rising of input and starts shooting when the value reaches SyncDely value or more. The count is reset at rising of synchronizing input (at falling when Synchron=DOWN).

Bank Number	Line Color			
	Orange/Black	Yellow/Black	Pink	Purple
0	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON

Setup Flow

(1) Select the model according to the shooting range and the character size.

Model	Parameter Wide	Field of View (mm×mm)	Focal distance (mm)	Available character width (mm)	Available character height (mm)
CVS4-N40W-R	OFF	53×25 to 115×53	40 to 100	2.8 to 44	2.8 to 43
	FAST/FST2	53×25 to 79×38	90 to 150	2.8 to 30	5.6 to 43
CVS4-N20W-R	OFF	53×25 to 79×38	90 to 150	2.8 to 30	2.8 to 31
	FAST/FST2	53×50 to 79×76	50 ± 6	1.0 to 11	5.6 to 62
CVS4-N23W-R	OFF	30×15	50 ± 6	1.0 to 11	1.1 to 12
	FAST/FST2	30×30	35 ± 4	0.75 to 8.2	2.2 to 12
CVS4-N21W-R	OFF	21×10	35 ± 4	0.75 to 8.2	0.75 to 8.2
	FAST/FST2	21×20	35 ± 4	0.75 to 8.2	1.5 to 16

(2) Connect the power supply and I/O.

Line color	Name
Blown	Power supply 12-24 V DC
Blue	Power supply 0 V
Orange/Black	Bank selection 0 input / Synchronous pulse input (at SyncPuls = ON)
Yellow/Black	Bank selection 1 input / String addition input (at String+ = ON)
Pink	Bank selection 2 input / External teaching input (at other than Bank = BKIN)
Purple	Bank selection 3 input / Synchronizing input (at other than Synchron = CONT)
Black	OK output / Light control output (at LightOut = OK or OK-P)
Red/Black	NG output / Light control output (at LightOut = NG or NG-P) / Bank 0-3 input / Teach in / String addition

When you use one of original Bank selection inputs for another purpose, you can assign NG output line (Red/Black) for the Bank selection input.

(3) Enter 0.Setup Flow in main menu.

Settings and functions are listed in the order of first setup, therefore anyone can setup easily. At first please initialize all settings. (See page 9)

Item	How to setup / Explanation	Page
Language	You can switch between Japanese and English.	
Orientn	Specify the shooting orientation to indicate correct orientation of characters on CVS4 display. 	9
Wide	Specify the shooting range double height by ON, reduces vertical resolution to decrease response time by FAST, and absorbs dispersion of object position by FST2.	10
Light	Switch the built-in lighting ON or OFF.	10
Shading	Corrects the threshold of characters and background on the left and right side of taken image.	10
Surface	Specify the surface condition of the object. If white characters on the dark background, set BLAK. If the back ground is white or light color, set WHIT.	10
Trapezid	Specify the angle difference between the CVS4 main unit and the object. (Unit : degree) 	10
ShtrLmt	Specify the upper limit of fixing shutter time at teaching. The formula is below. (Unit : 0.1ms) Shutter time upper limit = 10 × desired line width (mm) + the object moving speed (m/s)	10
Synchron	Specify the synchronizing input. Set UP to shoot at the edge of synchronizing input gets turn on from OFF. Set CONT for desktop test.	10
DateFrmt	Specify the order of date. For example, if the date format such as 28.2.2005: Set to the setting value to DMY.	11
Auto Tch	Performs 6.Auto Teach for automatic teaching.	8
Format 1 to Format 4	Please make sure the format of date and time.	11
If OK	If you have done setup, exit. If not, specify above settings Format to desired value and adjust following parameters to take an image of characters clearly.	

Specify the format, adjust taking an image, and perform semi auto teaching.

LightPwr	Specify brightness of built-in LED lighting from 6% to 100%.	10
Shutter	Specify shutter speed from 0 (fast) to 132 (slow).	10
Luster	Increase the setting value to avoid the luster effect.	10
Threshld	Specify threshold level depends on the image captured.	10

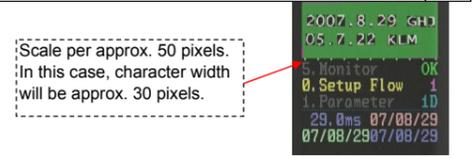
(Continued on the page 4)

(From the page 3)

DotCheck	Set to OFF when recognized date does not include dots between year, month, and date.	12
Check	Set to ON when need to recognize line feed as separation of year, month, and date.	12
Semiauto	Performs 7.Semiauto for semi auto teaching.	8
String	Performs B.String menu for confirming/editing character string.	7
If OK	If you have done setup, exit. If not, specify settings again.	

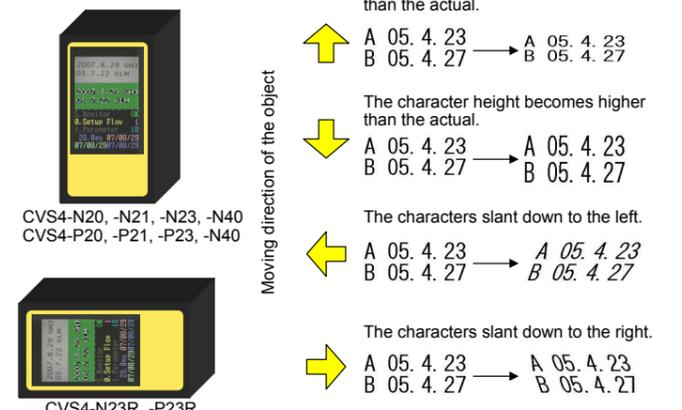
Adjust character thickness and size to setup manually.

Bold	Increase for dot and thin characters. Decrease for bold characters.	10
Rotate	Specify the range of search for the object rotation. (Unit : 0.94 degree)	10
SlantOfs	Specify the center of character slant angle. (Unit : degree)	10
Slant	Adjust the range of search for the character slant correction. (Unit : 0.85 degree)	10
CharWdth	Specify the typical character width such as "0" and "2". (Unit : Pixel) Set the character size references from the scale on screen	12
CharNarw	Specify the minimum character width to detect characters such as "." and "1". (Unit : Pixel)	12
CharHght	Specify the typical character height such as "0" and "2". (Unit : Pixel) Set the character size references from the scale on screen	12
Date Tch	Saves the number of days/minutes subtracting the current date from the recognized date/time. When STRG is set in any of Format 1 to 4, saves the existing characters.	11
EXIT	Exit from setup flow.	



To Shoot Moving Object

Rolling shutter effect



Keep the characters within the shooting range when their forms are modified. Increase the Slant value (the setting value in 8. Adj Paramtr) when the characters slant. The optimal value is automatically saved just by performing the teaching. To use the fixed value, turn ON or C+RS FixRSIt (in A.ExpertPrmr).

Expansion of shooting range

Turning ON Wide (the setting value in 1.Parameter) vertically doubles the shooting range of the screen. (Do not set to ON for CVS4-N40 and -P40.)



Decrease the influence of rolling shutter

Turning FAST Wide (the setting value in 1.Parameter) vertically reduces the resolution to half. The image transferring time and the slant down angle will be reduced to half.

Absorbs dispersion of the object position

Turning FST2 Wide (the setting value in 1.Parameter) vertically reduces the resolution to half and takes images 2 times in one trigger input. The shooting interval is approx. 13.3 ms. Outputs OK signal if any one of the judgments of 2 images. Also turning REPT SyncPuls (the setting value in 1.Parameter) takes images repeatedly until judgment is OK. Outputs NG signal if takes the timeout time that is specified SyncDely setting. (unit : 0.1ms)

2 Details and Operation of LCD

Main menu

(1) Shot screen: Pressing VIEW button to switch the monitor display mode. On "C" screen mode, background green color means OK judgment, red means NG, and yellow means while teaching.

(2) Scale per approx. each 50 pixels: Use as a guide to adjust the character width.

(3) Menu display: The selected item is displayed in yellow.

(4) Judgment result: OK: Date and time are within the upper and lower limits. The strings are identified. NG: Date and time are out of the upper and lower limits, or the strings are not identified. ER: Backup error of the calendar timer. (It disappears by resetting SECOND in 4.Calendar in the menu.)

(5) Current bank number (0 to 15)

(6) Displayed date/time items: 1D: The 1st date 2D: The 2nd date 1T: The 1st time 2T: The 2nd time CH: Number of characters and character string

(7) Response time (From synchronizing input to judgment output)

(8) Recognized date/time

(9) Upper limit of date/time

(10) Lower limit of date/time

UP button
Use to select a menu or setting items as well as to increase the setting value.

DOWN button
Use to select a menu or a setting item as well as to decrease the setting value.

VIEW button
Use to select a screen display mode. In switching the string to be monitored, press this button with Up/Down button together. Use also to select a menu or setting items as well as to increase the setting value.

SET button
Use to perform the selected menu or to write the setting value.

EXIT button
Use to switch between the main menu and the teaching menu, cancel the change of setting value, or to return to the menu.

Lock editing all parameters and disable teach-in, editing character string and calendar. (Locked) Press these button on main menu or teaching menu.

Cancel the lock.

Pressing **VIEW** to select the monitor display.

DC screen
Displays both of the live screen and the Cut-out screen.

D screen
Displays the live screen.

2 screen
Displays the differential screen.

C screen
Displays the Cut-out screen.

Pressing **UP** or **DOWN** after pressing **VIEW**

Date 1/2 Display
Displays: the 1st/2nd date (lower left), its upper limit (upper right), and the lower limit (lower right).

Time 1/2 Display
Displays: the 1st/2nd time (lower left), its upper limit (upper right), and the lower limit (lower right).

String Display
Displays the recognized number of characters and strings.

* When no date or time is specified, the string is displayed. The character color shows the identical rate with the dictionary. The character turns to ? when the difference exceeds the CharMrgn setting value.

Identical rate High <<	Pale green	Green	Light green	Yellow	Orange	Red	Dark red	Black	>> Low
Conversion value of CharMrgn	0	4	8	12	16	20	24	28	32

Menu Configuration

Main menu

Setup Flow
Indicates settings / functions in order for installation.

Parameter
The setting value for inputs and outputs.

Date/Time
Specify tolerance of Date and Time

ExpertParamtr
Setting of Extert Parameter

View NG Log
Displays the screen or the recognized string at the moment that the OK judgment turns to NG.

Calendar
Refers or sets the current date and time. Set to the Western calendar for leap year adjustment.

Auto Teach
Automatic Teaching

SemiautoTeach
Semi Automatic Teaching

Date Teach
Teaching of Date

String Editor
Execute String Editor

Dictnr Editor
Dicstionary Editor

Operation of Menu, Parameter Reference, Selection Screen

Menu screen → **Parameter reference screen** → **Parameter selection screen**

UP To the previous menu
DOWN To the next menu
SET To the selected menu

UP To the previous setting value
DOWN To the next setting value

UP Change the value to upper
DOWN Change the value lower
EXIT Cancel and return to previous screen.
SET Save and return to previous screen.

Function Detail of Each Menu

View NG Log

Save the screen when the OK judgment changes to NG in turning ON Save NG (the setting value in Parameter). This screen can be referred.

Screen Number: The latest screen number is 1.

Date and time of NG occurrence

Recognized string

String display mode

You can switch the recognized string display.

The character with smaller difference with the dictionary in the numerical and alphabetical characters.

The result compared only with the numerical and symbol dictionary.

The result compared only with the alphabetical dictionary.

- Up to 95 NG images can be saved. When exceeding, the oldest data is overwritten.
- While viewing NG log, the NG image is not saved even judged as NG. It automatically returns to the main menu when there is no switch operation for approx. 1 minute.

You can register the image into user dictionary. Following is example "9" is recognized as "4".

At the NG image that has character image to be recognized correctly, press "View".

Move the red square to the character by **UP** and **DOWN**

Choose the correct character to recognize by **UP** and **DOWN**

Then, press "SET" to register.

Calendar

Calendar modify screen

Set the date and time of built-in calendar timer.

UP To previous date/time
DOWN To next date/time

Return to the reference screen.

UP The date/time +1
DOWN The date/time -1

Set the year as the Western calendar for leap year adjustment.

String Editor

String modify screen

Set the string to be verified.

Setting string (Up to 22 characters)

Recognized string

UP To the previous character
DOWN To the next character

UP ASCII code +1
DOWN ASCII code -1

The position specified as "." in orange accepts any character.

Insert "." for separator when specify multiple STRG format.

Returns to menu.

Dictnr Editor

You can assign the registered character to a character to recognize.

Dictionary number

The image to recognize

The character to assign the image

Dctnr No The number of user dictionary
Choose the dictionary number to assign character or delete.

DctnrChr The character to assign the image.
Choose the character to assign the image to.

DeletChr When you execute deletion of selected dictionary number, the image will be deleted the image will be deleted and ExpDctnr will be decreased.

3 Teaching

Teaching type

Auto Teach
Performs teaching including shutter time, thresholds of characters and backgrounds, and the surface condition of object. Four (4) shootings are given before teaching completes. Automatically recognizes the format of date and time (Except for some formats).

Semiauto
Imports necessary information such as character size, fixing shutter time for recognition. Teaching completes without additional shooting in the condition that the characters have already been shot on the screen. When the date and time formats have already been set with the setting value Format 1 to 4 in 8.Adj Paramtr, these formats are used in priority.

Before executing Teaching, please setup following parameter in "Setup Flow" because they won't be set automatically by teaching.

Language, Orientn, Wide, Light, Shading, Surface, Trapezid, ShtrLmt, Synchron, DataFrmt,

Teaching menu

Select Auto Teach or Semiauto.

Internal process proceeds to 1 to 17. Semiauto starts from 4.

Upon completion, Completed is displayed.

Ending messages

Completed
Successfully completed.

String not found
No character was detected. The setting value returns to the original one. For correct display, adjust the setting values of Adj Paramtr (Shutter, ShtrLmt, Surface, Threshld) before performing Semiauto.

Format not found
The format of date and time was not found. The settings for the shutter time or the character size are saved. Specify Format 1 to 4 in 9.Date/Time before performing Semiauto.

Date overflow
The recognized date exceeds 5000 days from today. The wrong date might have been recognized. The setting such as the shutter time or the character size are saved. Specify Format1 to 4, DateFrmt, and YearOfst in Date/Time before performing Semiauto.

Date underflow
The recognized date exceeds 999 days before today. The wrong date might have been recognized. The setting such as the shutter time or the character size are saved.

Setting value available only in 6.Auto Teach

Format 1 to 4	String format Searches the format of date and time among the recognized strings. Does not search H:M, 2YM, STRG, etc. The setting value is overwritten.
LightPwr	Built-in light power Select HIGH when Synchron is other than CONT, and the required shutter time exceeds the upper limit (ShtrLmt).
Luster	Luster cancel Saturates the object surface with much luster by lighting to control the luster interference.
Shutter	Shutter time Calculates and sets the optimal shutter time.
Surface	Object surface Rewrites the setting to WHIT only when the surface is obviously white.
Threshld	Characters/Background threshold Calculates and sets the optimal threshold.
DotCheck	Dot Check Rewrites the setting to ON. If any format was not found, rewrites the setting to OFF and searches again.

Setting value set in Semiauto and Auto Teach

Bold	Bold display Displays the size -2 to +8 in order in bold and sets the value with minimum difference from the dictionary.
Format 1 to 4	String format Checks for the format with preset value. Finds optimal formats from the start to rewrite when the setting value of Format 1 is ---.
Rotate	Rotation search angle Rewrites the setting value added 1 to the rotating angle in teaching. Perform teaching when it rotates most. **1
Slant	Range of character slant correction Rewrites the setting value to half of the slant angle in teaching. Perform teaching when it slants most. **1
SlantOfs	Offset angle of character slant correction Rewrites the setting value to the slant angle in teaching. Perform teaching when it slants most. **1
1-Date+, 2-Date+	Date additional value Saves the number of days subtracting the current date from the recognized date.
1-Date-, 2-Date-	Date tolerance Rewrites the date tolerance to 3 when the day unsaved with 4YM (only the original tolerance is 0 when Semiauto). However, overwrites the date tolerance to 0 when the recognized date is today (without Semiauto). Rewrites the date tolerance to 0 when the day saved with 4YMD and the original tolerance is 3 in AutoTeach.
1-Time+, 2-Time+	Time additional value Saves the number of minutes subtracting the current time from the recognized time.
CharHght	Character height Saves the 72 % value of typical character height. Does not cut-out characters whose height is equal to this height or less. The low characters such as "-" or "." are separated into blocks with the height maintained. **2
CharNarw	Minimum character narrowness Saves the eighth value of typical character width. Does not cut-out characters whose width is less than the above-mentioned width. **2
CharWidth	Character width Saves the 90 % value of typical character width. Separates narrow width characters such as "1" or "." into blocks, maintaining the width. As for characters with double width or more, separates them into two. **2
String to be compared	When STRG is set in any of Format 1 to 4, saves the existing characters. Maximum characters to save can be modified with the setting value Max Strg, and the maximum rows to save can be modified with the setting value StrgLine.

**1 Does not rewrite setting value when performing 7.Semiauto when the setting value of FixRISit is ON or C+RS.
**2 Same as **1, when the setting value of FixRISit is CHAR or C+RS.

4 Settings

Automatically set Items in Teaching (**Auto Teach, Semiauto**)
Automatically set items in Teaching (**Auto Teach**)

The yellow setting items are common to all banks.
The purple setting items depend on each bank.

Parameter

Function LCD display	Setting range (Default)	Description
Bank Specification Bank	0 to 15, TCH, BKIN, COMM (BKIN)	Specifies how to select the bank number selection. 0 to 15 : Selects the set bank. TCH : Selects the bank with the bank selection 0, 1, and 3 inputs. BKIN : Selects the bank with the bank selection 0 to 3 input. COMM : Selects the bank with communication. The bank number set with communication returns 0 by turning off the power supply. (*The bank selection 2 input turns to the external teaching input other than with BKIN.)
Bank Copy BankCopy	0 to 15 (0)	Copies the current bank setting value and the string to the bank of set copy source bank number. The setting value becomes 0 when the power source is turned off.
Communication setting Communic	OFF, 4.8k, 9.6k, 19k2, 38k4, 57k6, 115k (57k6)	Sets the communication function. OFF : Disables communication function. Set when using the external light (CVS-LW1, -LU1). 4.8k to 115k : Uses the communication function. The baud rate order is 4800, 9600, 19200, 38400, 57600, 115200 bps. Data length without parity 8 bit and 1 stop bit. The external light or the remote monitor cannot be used.
Initialization Initialz	----, EXEC (----)	Saving the setting value as EXEC initializes all setting values and strings.
External light control signal LightOut	--, NG, OK, NG-P, OK-P (-)	--: Uses the red and black lines as NG output. NG : NG output (red/black line) turns OFF in synchronization with shooting. Use this when controlling commercial lights. OK output (black line) turns ON as usual when it is OK. OK : OK output (black line) turns OFF in synchronization with shooting. NG output (red/black line) turns ON as usual when it is NG. NG-P : NG output (red/black line) turns ON in synchronization with shooting. OK-P : OK output (black line) turns ON in synchronization with shooting.
NG Delay NG Delay	0-255 (0)	Outputs NG only when NG judgment continuously exceeds the specified counts. However, if there is no characters of specified formats, outputs NG immediately. Even with no NG output, NG is displayed on the screen and the NG screen is saved.
Off Delay OffDelay	0 to 5000 (0)	Delays OK/NG output turning OFF. Turns OFF when the judgment result continuously maintains the off condition for the setting time (ms) or longer. (OK and NG outputs timer work separately.)
On Delay On Delay	0 to 5000 (0)	Delays OK/NG output turning ON. Turns ON when the judgment result continuously maintains the on condition for the setting time (ms) or longer.
One shot /Output holding One-shot	OFF, ON (OFF)	When setting to ON , keeps the output ON by the off delay time since the output turns ON. When the off delay time is 0, holds the output ON. To turn OFF the output, switch the bank. This is valid in the condition other than Synchron=CONT .
Output synchronous delay count OutSynDi	0 to 15 (0)	Delays OK/NG output timing by counting synchronizing input. Available on the parameter One-shot is 1 and Synchron is UP or DOWN . In the case of reject process is after measuring process, be able to use the NG output for rejecting signal.
Save NG screen Save NG	OFF, CHNG, ALL, OK-A (OFF)	Save the NG image up to 95. 96th image will be overwritten on oldest image. OFF : Not save NG image, CHNG : Save NG image when it changed from OK to NG, ALL : Save all NG images, OK-A : Save all OK and NG images.
String additional input String+	OFF, ON, SET0, SCLR (OFF)	OFF : Uses the yellow and black lines as a bank selection 1 input. ON : Uses the yellow and black lines as a string additional input. The characters registered in B.String is counted up. At rising, changes the rightmost digit to the next character. The numerical part turns to 0 from 9 and the alphabetical character turns to A from Z accordingly. By turning off the power supply or switching the bank returns to the previous strings. (Example) The registered characters of B.String : AB0123 It turns to AB0124, AB0125, ---, AB0129, AB0130, AB0131, --- at rising of the yellow/black lines. SET0 : Uses the yellow and black lines as same as value is ON . The rising edge of the rose wire sets "0" to number symbols in B.String . Character string will be save to memory. SCLR : Uses the yellow and black lines as a string clear input. Character string will be save to memory.
Synchronizing input delay coefficient SyncDely	0 to 8000 (0)	Calculates the time from the synchronizing input to the actual shooting based on the cycle (Max. 4.19 sec) of synchronizing input. The shooting position remains stable even with the object speed changed, the stability deteriorates with the speed increased or decreased. The maximum delay time is 0.52 sec. Setting value = 8192 × delay time + cycle width of the synchronizing input * Delay time will be the number of pulse count when the setting value of SyncPuls is ON , and calculated the setting value of SyncDely × 64μs when the setting value of SyncPuls is TIME and SyncDely × 256μs when it is TIM4 .

Synchronizing Filter SyncFilt	40us to 50ms (40us)	Specify filtering time of synchronizing input. It's effective when the synchronizing input has some noise like relay output. Please note the capturing will be delayed for the time set in this parameter.
Synchronizing pulse input SyncPuls	OFF, ON, TIME, TIM4, REPT (OFF)	OFF : Shoots when after waiting the time calculated by SyncDely formula. ON : Shoots when the rising count of bank selection 0 input reaches the SyncDely setting value from the synchronizing input rising (at Synchron=UP). Inputs the pulse string of encoder. TIME : Shoots when after waiting for the setting value of SyncDely × 64(μs) TIM4 : Works same as TIME , but unit is SyncDely × 256(μs). REPT : Takes images repeatedly until judgment is OK. Outputs NG signal if takes the timeout time that is specified SyncDely setting. (unit: 0.1ms)
Synchronizing input Synchron	LOW, DOWN, HIGH, UP, CONT (CONT)	Sets the synchronizing input. When setting other than CONT , the bank selection 3 input becomes the synchronizing input. The followings are the shooting conditions: LOW : Shoots while the synchronizing input is OFF. DOWN : Shoots when the synchronizing input turns off from ON. HIGH : Shoots while the synchronizing input is ON. UP : Shoots when the synchronizing input turns on from OFF. CONT : Continuously imports the images.
Spread of shooting range (vertically) Wide	OFF, ON, FAST, FST2 (OFF)	OFF : Sets the shooting range to the normal resolution. ON : Doubles the shooting range height from the normal. Double roughness is applied with the same vertical resolution. Re-teaching is required when switching from Wide . Built-in light source might be appeared in four corners of CVS4-N40W and -P40W, so please do not set to ON . FAST : Reduces vertical resolution of the image sensor, to make the half of the image transferring time. FST2 : Reduces vertical resolution as same as FAST , and takes images 2 times in one trigger input. The shooting interval is approx. 13.3 ms. Outputs OK signal if any one of the judgments of 2 images.
NG input / output NG-I/O	Out, Bnk0, Bnk1, Bnk2, Bnk3, Str+, Tch (Out)	Specify function of NG output line (Red/Black). Out : Use NG output as it is. Bnk0 : Use NG output as Bank input 0. Bnk1 : Use NG output as Bank input 1. Bnk2 : Use NG output as Bank input 2. Bnk3 : Use NG output as Bank input 3. Str+ : Use NG output as String addition input. Tch : Use NG output as Teach in.
Output Select Out Sel	Norm, Rev (Norm)	Specify output polarity. Norm : Output OK is ON when it's OK. Rev : Reverse polarity of OK/NG output.

9.Date/Time

Function LCD display	Setting range (Default)	Description
Date additional value 1-Date+ 2-Date+	-999 to 5000 (0)	Compares the date added with the set days with the recognized date against today. 1-Date+ corresponds to the 1st date, 2-Date+ to the 2nd date. When the value larger than 0 is set in 1-Time(2-Time) and the additional value of the current time and 1-Time(2-Time) exceeds 23.59, the date turns to the next day. (The unit: day) When Format1 is set to ---, sets the number of characters to compare.
Date tolerance 1-Date± 2-Date±	0 to 1000 (0)	Sets the margin level of date to compare. If the range is within before and after the setting value, it is acceptable. (The unit: day) When Format1 is set to ---, sets the margin of the number of characters to compare. (i.e.) When 1-Date+ is 10, and 1-Date± is 1, the acceptable range for the number of characters is 9 to 11.
Time additional value 1-Time+ 2-Time+	0 to 1439 (0)	Compares the time added with the set minutes with the recognized time. 1-Time+ corresponds to the 1st time, 2-Time+ to the 2nd time. (The unit: minute)
Time tolerance 1-Time± 2-Time±	0 to 720 (30)	Sets the margin level of time to compare. If the range is within before and after the setting minute, it is acceptable. The margin level also works to the date. When crossing dates, the dates before and after are acceptable. (The unit: minute)
String format Format 1 Format 2 Format 3 Format 4	---, 4YMD, 4YM, 2YMD, H:M, 2YM, HOUR, STRG, A-MD, A-M, A-HM, A-H, A-D, MD, 4YED, 4YE, 2YED, 2YE, PY, SSAD (---)	Specifies the format of the date, time, and the string. Simultaneously judges four types of formats from Format1 to 4. Remember that the only two dates, two times and four strings can be specified. 4YMD to 2YMD and 4YED to 2YE are automatically recognized in teaching. For other formats, specify them before performing 7.Semiauto . ---: Does not specify the format. 4YMD : 4-Digit-Year/Month /Date (2005.10.26 or 26.10.2005) 4YM : 4-Digit-Year/Month (2005.10 or 10.2005)* 3 2YMD : 2-Digit-Year/Month /Date (05.10.26 or 26.10.05) H:M : Hour and minute divided with ":" (13:57) 2YM : 2-Digit-Year/Month (05.10 or 10.05)* 3 HOUR : Hour only (13)* 4 STRG : String up to 22 characters (AB13009) If specify multiple STRG , set the character "_" for delimiter in B.String menu. A-MD : Month /Date in alphabetical/numerical characters * 1 ,* 3 A-M : Month in alphabetical/numerical characters * 1 ,* 3 A-HM : Hour and minute in alphabetical/numerical characters A-H : Hour in alphabetical/numerical characters * 4 A-D : Date written in alphabetical/numerical characters. * 1 ,* 2 MD : Month /Date (10.26 or 26.10)* 1 4YED : 4-Digit-Year/Month in English/Date (2005OCT26) 4YE : 4-Digit-Year/Month in English (2005OCT)* 3 2YED : 2-Digit-Year/Month in English/Date (05OCT26) 2YE : 2-Digit-Year/Month in English (05OCT)* 3 PY : Year only (5) If equal to current year, possible to read 1-digit year. * 2 , * 3 SSAD : Analyzes specified commands in B.String and stores result to date. For more details, please contact our distributor. Setting Format1 to --- enables the characters judgment function, that accepts the result when the total number of recognized characters are within setting range. Set the characters with 1-Date+ , and set the margin with 1-Date± .
No. of Character No. of CHR	0-31 (0)	Specify number of character when check the number of character.
No. of Tolerance No. of TOL	0-15 (0)	Specify tolerance of the number of character when check the number of character.
Max string characters Max Strg	0 to 22 (0)	Specifies the maximum characters to register when performing 7.Semiauto and STRG is specified in Format1 to 4. The setting 0 means the same with that of 22. Even the characters are less than the setting value, the rows exceeding the setting value in StrgLine are not registered. Set the top number of characters for the case including the string and dates in a row, such as "ABC 05.3.25." (Set 3 for this case.)
Number of character for month notation MonthChr	3 to 9 (3)	Specifies the number of character for month notation in English. (Format1 to 4= 4YED, 4YE, 2YED, 2YE) The setting 3 means "JAN" is January. The setting 7 and above means "JANUARY" is January.
String lines StrgLine	1 to 10 (1)	Specifies the number of string lines at the time of specifying the STRG in Format 1 to 4. The line feed is inserted even in the large interval between characters. Therefore, the part with large interval is counted as a line.
Year Offset YearOfst	0 to 99 (0)	Subtracts the setting value from the recognized year to compare the current date. The built-in calendar corresponds only to the Western calendar. The Japanese calendar is converted to the Western one by subtraction.

*1 For the year unsaved with **MD, A-MD**, etc, that of saved in the previous **Format** is set. When nothing is saved, the current value of year is set. If the judgment was NG, the next value of year is set and re-judge.
For example, when today is Dec.31.2005 and **1-Date+** is 1, the upper and lower limit is Jan.1.2006. Next the printed character is 1.1, the current value of year is 2005 then the recognized date is Jan.1.2005 and the judgment is NG. But set the next value of year 2006 and re-judge then the recognized date is Jan.1.2006 and the judgment is OK.
*2 For the month unsaved with **A-D**, that of saved in the previous **Format** is set. When nothing is saved, the current value of month is set.
*3 For the day unsaved with **4YM, 2YM**, etc, that of saved in the previous **Format** is set. When nothing is saved, the current value of day is set. If the judgment was NG and today is 1st to 15th, 30 is set. If today is 16th to 31st, 1 is set. For example, when today is Oct.31.2005 and **1-Date+** is 1, the upper and lower limit is Nov.1.2005. Next the printed character is 11.2005, the current value of day is 31 then the recognized date is Nov.31.2005 and the judgment is NG. But set 1 (because today is 31st) and re-judge then the recognized date is Nov.1.2005 and the judgment is OK. (Please set the value of **1-Date±** to 3 and above.)
*4 In the case of the hour format (**HOUR, A-H**), the current minute is placed on the recognized hour. (Please set the value of **1-Time±** to 60 and above.)

A.ExpertPrmtr

Function LCD display	Setting range (Default)	Description
Character recognition margin CharMrgn	0 to 255 (30)	Specifies the range to allow the difference between cut-out characters and the data in the dictionary. When the difference exceeds the setting value, the character is displayed as "?". During teaching, the setting value is processed to 1/2.
Character space ChrSpace	x1.5 to x7.0 (x4.0)	Inserts the space (Line feed) when the interval between characters becomes the set magnification of character width (CharWdth).
Extension dictionary ExpDctnr	0 to 56 (0)	The number of characters registered in the extension dictionary. Automatically written in registering with PC.
External light source brightness ExtLgtPw	6%~100% (100%)	Adjusts CVS-LW1 (external light source) brightness. The parameter Communic should be set to OFF and disconnect communication cable and CVS-M1 monitor. **2
External teach-in ExtTeach	SEMI, AUTO, DATE, NSTR, SA M, AT M, DT M, NS M (SEMI)	SEMI : Perform Semiauto when the external teach-in input is turned on. AUTO : Perform Auto Teach when the external teach-in input is turned on. DATE : Perform Date Teach when the external teach-in input is turned on. NSTR : It won't store recognized string when teaching is executed. SA M : Perform as SEMI but the parameters will presume after switching Bank or restarting up the unit. AT M : Perform as AUTO but same as SA M . DT M : Perform as DATE but same as SA M . NS M : Perform as NSTR but same as SA M .
Rotation/Slant correction and characters size fixing FixRotSlnt	OFF, ON, CHAR, C+RS (OFF)	OFF : Automatically sets the rotation correction range (Rotate) and the slant correction range (Slant) during teaching. ON : Does not rewrite the value of Rotate, Slant . When the object moves faster than in teaching, preset the larger value in Rotate, Slant . CHAR : Does not rewrite the character size (CharHght, CharNarw, CharWdth) during teaching. When there are bold and narrow characters, adjust the above-mentioned setting value to be recognized before performing teaching. C+RS : Does not rewrite the rotation/slant correction nor the character size. * When performing 6.Auto Teach , these settings are ignored.
Teach date range TchRange	---, 1~2047 (---)	Specify limit of date range when Automatic Teaching, Semi-automatic Teaching and Date Teaching are executed. ---: No limit. It will set from -999 to +5000 days. 1~2047: Set limit as -1 for past and up to this value for the future.
Internal dictionary IntDctnr	OFF, ON (ON)	The function to separate the internal dictionary. Turn it OFF when comparing the character only by the extension dictionary.
LCD Up Down reverse LCD View	NORM, REVS (NORM)	NORM : The normal LCD display. REVS : Displays the LCD by reversing upside-down. Uses when attaching the sensor with facing the upside-down.
Mask Left / Right / Up / Down Coordinate Msk Left Msk Right Msk Up Msk Down	0 to 255 (0 / 255 / 0 / 243)	Specify the left / right / top / bottom edge coordinate that not need to check.
Print status PrintSts	NORM, STMP, PRNT, STPR (NORM)	Specify print status. NORM : For standard printing. STMP : For Stamp. Thicken upper or lower end of the character. PRNT : For printing with some pattern at the side of it. STPR : For Stamp and printing with some pattern.
Character Re-scan Re-Scan	OFF, ON, FULL, SEQN (FULL)	Searches again the date and time from the next character at NG judgment. Ignores unnecessary characters on the screen. In ON, FULL , ignores "." (dot) in the recognized strings when comparing the strings. (Format1 to 4= STRG). OFF : Does not re-scan. ON : Starts re-scan from the character of the next line feed including the large interval between characters. FULL : Starts from the next character. Scans even without interval between characters. However, note that 10:00 is regarded as OK even when 0:0 is OK. When recognizing the time, set to ON . SEQN : If judged OK in a format when slant retry (Re-Slant) and shooting repeatedly (SyncPuls = REPT or Wide = FST2), judges next format in next shooting.
Slant Re-try Re-Slant	OFF, 0.9, 2.5, 4.3, 6.0 (2.5)	Performs re-recognition operation by slanting the characters to the left and right at NG judgment. The more increase setting value, it prolongs the processing time at NG. Setting value means correction angle.
Character separation ON (1-3 lines) Sprt 123 Sprt 456	xxx to ooo (ooo)	Enables the process to separate two, three, and four characters in link. Enables by changing to O in the first lines from the left. (Examples) When Sprt123 is xxx , enables to separate only the first line. When Sprt456 is xxx , disables to separate the 4th line.
Zero Check ZeroCheck	--- to 123 (---)	Judges as NG when the value for the month/date/minute is 1 digit. Judges as NG when the year is not 2 or 4 digits. (Without Format=PY) ---: Accepts either 1 digit or 2/digits. (05 and 5 are recognized as the same.) 1-- : Checks if the first numerical values are 2 digits. If the time is 1 digit in Format=H:M , judged as NG. -2- : Checks if the second numerical values are 2 digits. When Format=2YMD , and the month is 1 digit, judges as NG. 12- : Checks if the first and second numerical values are 2 digits. --- 123 : Checks if the 3 numerical values are 2 digits.

(1) Character is connected with the next character

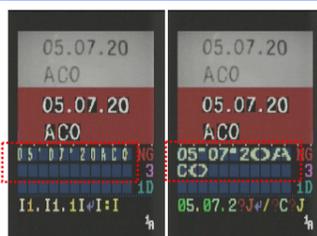


The situation that the character is connected with the next character causes unsuccessful cut-out of the space between characters. This may occur in the case of capturing bold characters.

Solution
 (1-1) Decrease the setting value **Bold** in **Setup Flow**.
 >> Decrease the bold level and widen the space between characters. Adjust the brightness of characters by decreasing the **Threshld** value.
 (1-2) Decrease the setting value **CharWdth** in **Setup Flow**.
 >> The separation function for up to 2, 3 and 4 characters operates against the characters with double to quadruple width of the **CharWdth**. Adjust the value referring to the dots at the bottom of the screen that shows size (**CharWdth**).

(1-3) Adjust the value of the setting value **Trapezid** in **Setup Flow**.
 >> The screen changes to a trapezoid shape when CVS4 is set angled to the object. When it changed, the characters slant at the both edges on the screen. Adjust the setting value to correct this situation. Set the setting value to the mounting angle of CVS4.

(2) Characters are incorrectly compared with dictionary or wrongly read



Check the characters clipped-out by changing screen mode by "View" button.
 >> Sometimes, the character gets too narrow due to big **CharWdth** or gets divided into two.

Solution
 (2-1) If the character is too small **CharWdth** in **Setup Flow** is too large. If it's divided into two, **CharWdth** is too small. Normally the 90% of value of typical character width is saved in **Auto Teach** or **Semiauto**. However, adjust it if needed.



>> Clipping-out of characters is OK but characters are too small to be recognized stably.

Solution
 (2-2) Set **Re-Slant** in **ExpertParamtr** bigger so that the characters are displayed as wide as possible. Adjust thickness of the characters by **Bold** in **Setup Flow**. Set **Slant**, **SlantOfs** and **Rotate** in **Setup Flow** to 0 when the object rotation or the character slant is very small. Set **Wide** in **Setup Flow** to **OFF** when it's **ON** or **FAST**.



>> Patterns exist around the characters and the characters are not clipped-out correctly.

Solution
 (2-3) Move the position of the image or mask the pattern by adjusting **Msk Left**, **MskRight**, **Msk Up**, and **Msk Down** in **ExpertParamtr**.



>> Line feed as separation mark is detected at between characters.

Solution
 (2-4) The line feed is detected when the space between characters is big. Increase **ChrSpace** in **ExpertParamtr** to neglect the wide space between characters.



>> Clipping-out is OK but the characters are recognized wrongly.

Solution
 (2-5) Basically, Chinese and Korean characters are not recognized correctly. Register expansion dictionary before teaching to recognize special font and characters. Increase **CharMrgn** in **A.ExpertPmtr** to recognize most close character in built-in dictionary instead of "?".



>> Images are unstable due to glossy surface of the characters or backgrounds.

Solution
 (2-6) Increase the **Luster** value in **Setup Flow** and saturate the glossy part of screen to clip-out the characters. Adjust the **Threshld** in **Setup Flow** to clip-out characters stably. If the clipping-out of characters is still not stable, adjust the CVS4 mounting angle or use the external light to prevent the direct reflection of light.



>> The captured image is blurred.

Solution
 (2-7) Adjust the distance between CVS4 and the object to get clear image.

(2-8) When the object moving speed is fast, please refer solution (5-3).



>> Fine noises on the screen are recognized as dots.

Solution
 (2-9) Increase **CharNarw** in **Setup Flow** to ignore the small characters.

(2-10) Increase the **Threshld** in **Setup Flow** to prevent the fine noises recognized as characters.



>> Clipping-out of characters is not successful due to the image is captured from an angle.

Solution
 (2-11) Change the angle to front side. To prevent reflection of the built-in light, set **Light** in **Setup Flow** **OFF** and use the external light.



>> Horizontal line of "2" or "7" gets thinner and be misrecognized. Increasing **Bold** makes recognition between "6" and "8" wrongly.

Solution
 (2-12) Thicken top and bottom line of the characters by setting **PrintSts** in **ExpertParamtr** to **STMP**.

(3) String is not recognized as the specified date or time



The date and time may not be correctly displayed even though the strings show the correct date and time order. This problem occurs when **Re-Scan** in **ExpertParamtr** is set to **FULL** or **ON**. The string within the upper and lower limit of date and time is searched from the top line. If no OK string exists at the upper line, the date and time recognized in the later part of string.

Solution
 (3-1) Select **OFF** for the **Re-Scan** setting or correctly set the upper and the lower setting of date and time in **Date/Time**.

(4) Judged as NG at the point at the date change



This trouble occurs when the calendar in the printer is different from CVS 4 calendar.

Solution
 (4-1) Increase the **1-Time±** in **Date/Time**. Set the duration of specified time (minutes) as the upper and lower limit of the date before the date change. Also set the current date and the previous date as the upper and lower limit on the current date, the next date and the after the date change. Set with **2-Time±** for the second date (**2-Date**).

(4-2) Increase the **1-Date±** in **Date/Time**. In the format of Y/M, the difference of months occurs at the month change with the different days. Normally, setting to **3** avoids any trouble in any month.

(5) Wrong recognition in high speed of object



The slant correction is insufficient as the object moves faster than when teaching is done.

Solution
 (5-1) Set **FixRtSlit** in **ExpertParamtr** to **ON** in advance and increase the **Slant** in **Setup Flow** up to the value of required slant correction. Doing this prevent rewriting of the **Slant** and **SlantOfs** value in teaching.

(5-2) Setting **Wide** in **Setup Flow** to **FAST** makes reducing image transferring time and slant angle.



High speed object blurs the shot images.

Solution
 (5-3) Refer to the page of setting **ShtrLmt** in **Setup Flow** before executing teaching. Add the external light if the screen is not enough light in teaching (the case the **ShtrLmt** value becomes 5 or less).



Changing the speed of the object shifts the position of the image and the characters run off the screen edge.

Solution
 (5-4) To get the characters in FOV, set **Wide** (in **Setup Flow**) to **FST2**, or set **SyncPuls** (in **Parameter**) to **REPT**. And decrease **Rotate** and **Slant** (in **Setup Flow**) and set **Re-Slant** (in **ExpertParamtr**) to **OFF**, to reduce processing time.



When the object moves fast, the character height changes so clipping-out will be impossible.

Solution
 (5-5) Execute teaching under the condition that the object moves fast. Or decrease the **CharHght** value in **Setup Flow** to clipping-out. (In this picture, the work moving at 0.7m/s.)

Moving direction of the work

(6) Unsuccessful String registration in 7.Semiauto



In the string registration (specifies **STRG** in **Format 1 to 4**), assign the numerical character to the numerical part and alphabetical character to the alphabetical part if the strings have already been registered.

Solution
 (6-1) Clear the string with **String Editor** before executing **Semiauto**. Clearing the top character (change to ".") also clears the remaining characters. Characters before "A" of the ASCII code are judged as numerical ones, and as alphabetical ones if it's "A." or after "A."

(7) Misrecognizes date when date is 1-digit.



Recognized date characters that be linked the original 1-digit date and the next character.

Solution
 (7-1) Decrease **ChrSpace** in **ExpertParamtr** to insert line-feed character. (Ex. "2005.11.1 SA")
 (7-2) Be sure to print 2-digit date. (EX. "2005.11.01 SA")
 (7-3) Register the next character to the expansion dictionary as character ".".
 (7-4) Decrease **CharMrgn** in **ExpertParamtr** to recognize the next character as "?". (Be careful not to change "." date characters that you want to recognize.)

(8) NG judgment when verifying multiple lines string



Correct characters are set in **String Editor**, but the judgment is still NG.

Solution
 (8-1) Set necessary lines at **StrgLine** in **Date/Time** (This example is 2).
 (8-2) Set **Format** in **Date/time** to **STRG** the number of times of necessary lines, and specify "." character in **String Editor** as the separator. (This example requires **Format 1** as **2YMD**, **Format 2** as **STRG**, **Format 3** as **STRG**, and **String Editor** as "S_A5".)

(9) String is too long to fit all characters in FOV.



Printing width is too long to fit all characters in the FOV. Selecting wider FOV type is not enough for minimum character size.

Solution
 (9-1) Set the parameters as below. Specify the parameter of **Format 1, 2, 3, and 4** starting from left in the print characters when the object moves from right to left. Starting from right when the object moves from left to right.

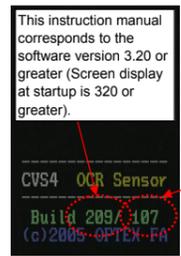
Parameters
Synchron in **Setup Flow** = **UP** or **DOWN**
SyncDely in **Parameter** = **Period** of capturing (Unit : 0.1ms)
SyncPuls in **Parameter** = **REPT**
Re-Scan in **ExpertParamtr** = **SEQN**
Re-Slant in **ExpertParamtr** = **OFF** (to reduce response time)
Format 1 in **Date/Time** = **4YMD** (in this example)
Format 2 in **Date/Time** = **STRG** (in this example)
 *Exchange **Format 1** and **2** when the object moves from left to right.

Optional Devices

- CVS-M1: Remote monitor**
 Convenient for setup and operation from a distance.
- CVS-LW1, -LU1: External light**
 Convenient in shortage of the light intensity or in detecting highlighted characters. "-LW1" is white light and "-LU1" is ultraviolet light. To use, set **Communic** to **OFF**. Other types of external lights are also available. For details, contact our distributor.
- CVS-C3S: Extension cable for remote monitor (3m)**
 The extension cable for CVS-M1. Connectable up to 4 cables.
- CVS-C2C: RS-232C communication cable (2m)**
 The cable is for transferring the setting values, register the dictionary, reading and setting strings, storing NG screens, and selecting banks. For extension, use the level converter to avoid communication error.

ASCII characters list that CVS4 is able to indicate on LCD screen.
 !# \$ % & () * + , - . / 0 9 : ; < = > ? @ A to Z [\] ^ _ ` a to z ~
 Characters list in the internal dictionary
 . / 0 to 9 : A to Z

The exclusive software describes the following information: The extension dictionary registration, the date registration in alphabetical characters, save and transfer of setting value, the string reading by communication, and bank selection. Contact our Customer Service Department to obtain the software.



Indicates hardware version.

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