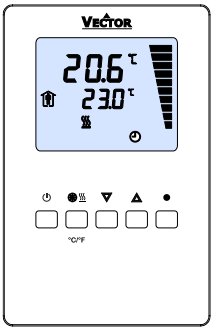
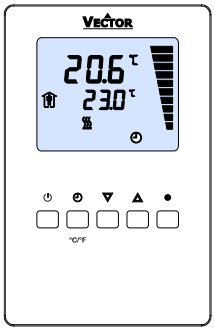
TCI-W13-U, TCI-W23-U Series Wall Mounted Universal Controller

Features

- Universal PID and/or binary control for any analog input/output signal and range.
- Multiple auxiliary functions: heat-cool auto changeover, automatic enable, setpoint compensation.
- Differential, averaging, min and max functions
- Cascading of control loops (-W23 type).
- Alarm monitoring of low and high limits on all inputs.
- Programmable reaction in case of alarm.
- Feedback function for inputs and set points.
- Functions for dehumidifying, set point shift, cascade control.
- Password protected programmable user and control parameters.
- Blue backlight.



TCI-W13-U



TCI-W23-U

TCI-W23-U also includes

- Power Cap protected real-time clock with 48hr power backup.
- Clock with up to 8 switching events.
- 7-day programmable schedules, with options including change of setpoints and direct position of manual outputs.

Applications

- Fan coil units
- Heat exchangers
- Zoning
- VAV
- Air handlers
- Fan, Pump control
- Humidifiers
- Dehumidifiers
- Ventilation
- Radiant heating
- Radiant cooling
- Pressurization

General

- **TCI-W13-U**: 1 independent control loop, 1 internal temperature sensor, 1 universal input (analog/binary/temp), 1 binary/PWM output, 2 analog outputs
- **TCI-W23-U**: 2 independent control loops, 8 time schedules, 1 internal temperature sensor, 1 universal input, 1 passive input, 1 binary/PWM output, 2 analog outputs
- Internal temperature sensor standard. Add replaceable humidity element as required: AES3-HT-A2 (2%), AES3-HT-A3 (3%), or AES3-HT-A5 (5%)
- Flexible application configuration is made with a parameter-setting routine using the standard operation terminal.

Product Name

T C I - W 2 3 - U

Housing	Blank = square housing
In/Outputs:	See table below
Control loops:	1 = 1 control loop, 2 = 2 control loops
Mounting:	W = Wall mounted
Series:	**TCI**

Types and Ordering

Product Name	Product No.	Loop	Temperature Sensor (internal)	Humidity Sensor (internal)	UI	TI	Binary Output	Analog Output	Time Schedules	Option
TCI-W13-U	40-10 0267	1	1	0	1	0	1	2	0	Standard
TCI-W13-U-H	40-10 0268			1						rH Sensor 3% acc.
TCI-W23-U	40-10 0271	2		0		1			8	Time schedules
TCI-W23-U-H	40-10 0272			1						rH Sensor 3% acc.
AES3-HT-A2	40-50 0102			1						rH Sensor 2% acc.
AES3-HT-A3	40-50 0103			1						rH Sensor 3% acc.
AES3-HT-A5	40-50 0104			1						rH Sensor 5% acc.

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Technical specifications

Caution! This device is intended to be used for comfort applications. Where a device failure endangers human life and/or property, it is the responsibility of the owner, designer and installer to add additional safety devices to prevent or detect a system failure caused by such a device failure. Vector Controls or its affiliates cannot be held liable for any damage caused by such a failure. Failure to follow specifications and local regulations may endanger life, cause equipment damage and void warranty.

Power Supply	Power Requirements	24 VAC ±10%, 50/60 Hz, Class 2, 2.0 A, 48 VA max. 24 VDC ±10%
	Power Consumption	Max. 3 VA
	Electrical Connection	Terminal Connectors 0.34…2.5 mm² wire (AWG 24…12)
	Clock backup	Min. 48 hours
Signal inputs	Universal Input Input Signal Resolution Impedance	Setting for Voltage or Current 0–10 V or 0–20 mA 9.76 mV or 0.019 mA (10 bit) Voltage: 98kΩ Current: 240Ω
	Universal Input Range Accuracy	Input configured to remote temperature (RT) or digital input (DI) NTC (Sxx-Tn10 sensor): -40…140 °C (-40…284 °F) -40…0 °C (-40…32 °F): 0.5 K 0…50 °C (32…122 °F): 0.2 K 50…100 °C (122…212 °F): 0.5 K > 100 °C (> 212 °F): 1 K
	Humidity Sensor AES3-HT-Ax: Range Measuring Accuracy Hysteresis Repeatability Stability	Capacity sensor 0…100 % rH See Figure to the right ± 1% ± 0.1% < 0.5% / year
Signal outputs	Analog Output Output Signal Resolution Maximum Load	 DC 0–10 V / 0–20 mA 9.76 mV / 0.019 mA Voltage: ⩾1kΩ Current: ⩽250Ω
	Relays Outputs AC Voltage DC Voltage	 0…48 VAC, 2(1.2)A max. (Observe local regulation) 0…30 VDC, 2A max.
	Insulation strength between relays contacts and system electronics: between neighboring contacts:	 2000V AC to EN 60 730-1 1250V AC to EN 60 730-1
Environment	Operation Climatic Conditions Temperature Humidity	To IEC 721-3-3 class 3 K5 0…50 °C (32…122 °F) <95 % RH non-condensing
	Transport & Storage Climatic Conditions Temperature Humidity Mechanical Conditions	To IEC 721-3-2 and IEC 721-3-1 class 3 K3 and class 1 K3 -25…70 °C (-13…158 °F) <95 % RH non-condensing class 2M2
Standards	Degree of Protection	IP30 to EN 60 529
	Pollution Class	II (EN 60 730-1)
	Safety Class	III (IEC 60536)
	Overvoltage Category	I (EN 60 730-1)
General	Material: Cover, back part Mounting Plate	Fire proof ABS plastic (UL94 class V-0) Aluminum
	Dimension (H x W x D)	Front part: 21 x 88 x 88mm (0.8 x 3.5 x 3.5 in.) Power case: ø 58 x 32 mm (ø 2.3” x 1.3”)
	Weight (including package) TCI-W13-U TCI-W23-U	 205g (7.2 oz.) 220g (7.8 oz)

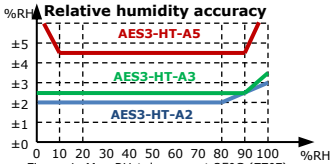


Figure 1: Max RH-tolerance at 25°C (77°F) per sensor type

Product testing and certification

CE Declaration of conformity

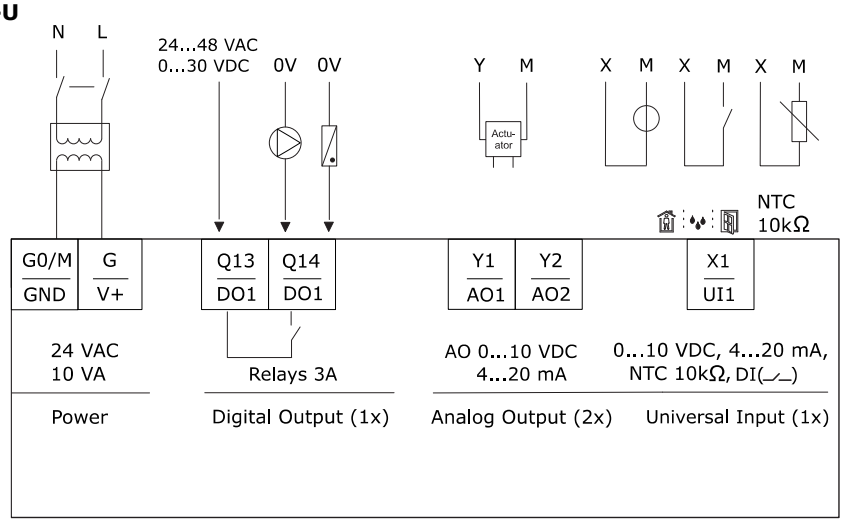
Information about the conformity of our products can be found on our website www.vectorcontrols.com on the corresponding product page under "Downloads"

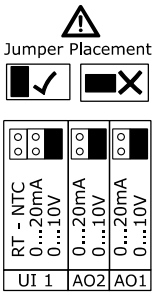
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Wiring and Connection

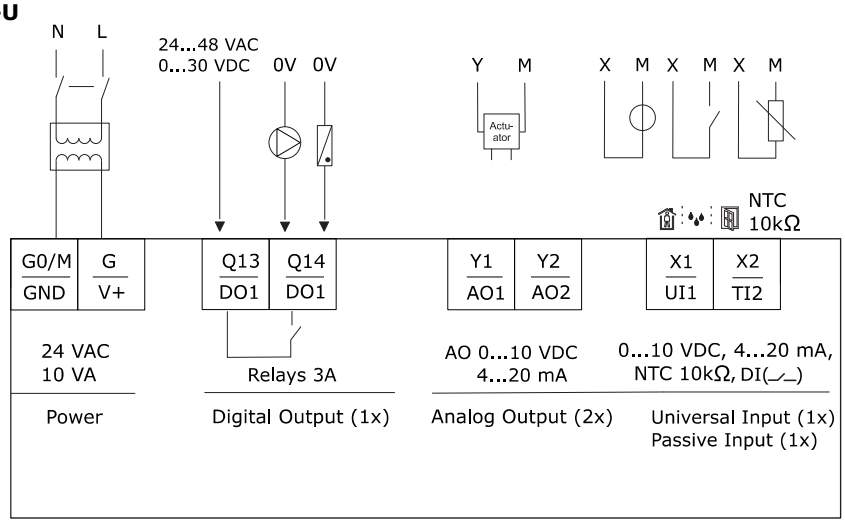
WARNING! Live Electrical Components
During installation, testing, servicing and troubleshooting of Vector Controls products, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury

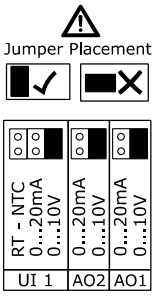
TCI-W13-U





TCI-W23-U





GND	Power supply:	0V, -24VDC; common for power supply, analog in- and outputs
V+	Power supply:	24VAC, +24VDC
DO..	Binary outputs:	Potential free relays contacts (see technical specification)
UI..	Universal input:	NTC 10kΩ @ 25°C (77°F), 0…10 V or 0…20 mA (selectable by jumper)
TI..	Passive input:	NTC 10 kΩ @ 25 °C (77 °F) or open contact
AO..	Analog output:	0…10 V or 0…20 mA (selectable by jumper)

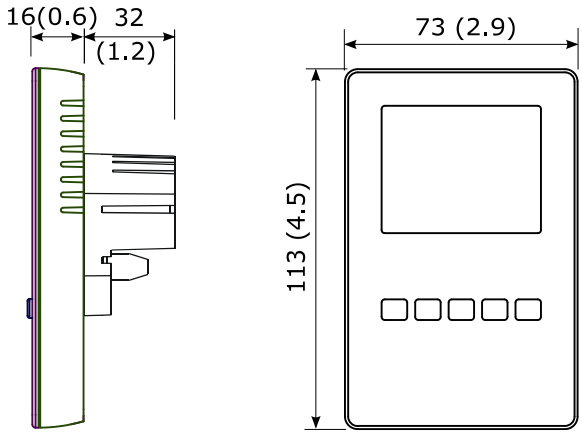
Use copper, twisted pair, conductors only. The operating voltage must comply with the requirements for safety extra-low voltage (SELV) as per EN 60 730. Use safety insulating transformers class II with double insulation as per EN 60 742; they must be designed for 100% ON-time. When using several transformers in one system, the connection terminal 1 must be galvanic connected. TCI is designed for operation of AC 24 V safety extra-low voltage and is short-circuit-proof. Supplying voltages above AC 24 V to low voltage connections may damage the controller or other devices. Connection to voltages exceeding 42 V endangers personnel safety.

Jumper Settings

See TCI-W installation sheet no. 70-000539 for details (www.vectorcontrols.com).

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Dimensions mm (inch)



Selection of actuators and sensors

Temperature sensors: Use Vector Controls NTC sensors to achieve maximum accuracy:SDB-Tn10-20 (duct), SRA-Tn10 (room), SDB-Tn10-20 + AMI-S10 as immersion sensor.

Actuators: Choose modulating actuators with an input signal type of 0-10 V DC or 4-20 mA (Min. and max. signal limitations may be set with parameters.3-pointactuators with constant running time are recommended.

Binary auxiliary devices (e.g. pumps, fans, on/off valves, humidifiers, etc): Do not directly connect devices that exceed specified limits in technical specifications – observe startup current on inductive loads.

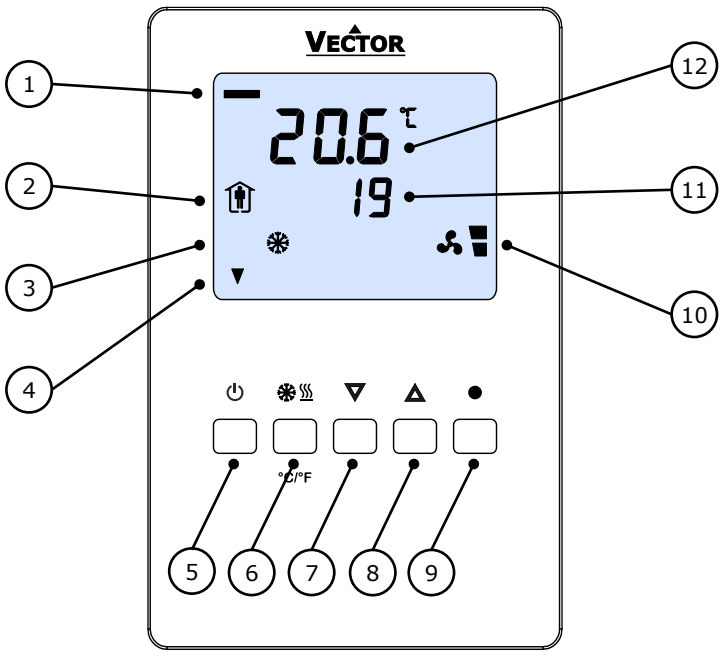
Mounting and installation

Mount the controller on an easily accessible interior wall, approx. 1.5 m (4.5 ft) above the floor, in an area of average temperature. Avoid direct sunlight and other heat sources, locations behind doors, outside walls, air outlets and wet or condensation-prone locations.
Mount and connect the controller as shown in the TCI-W installation sheet no. 70-000539 supplied with the device, and wire it according to the connection diagram above.

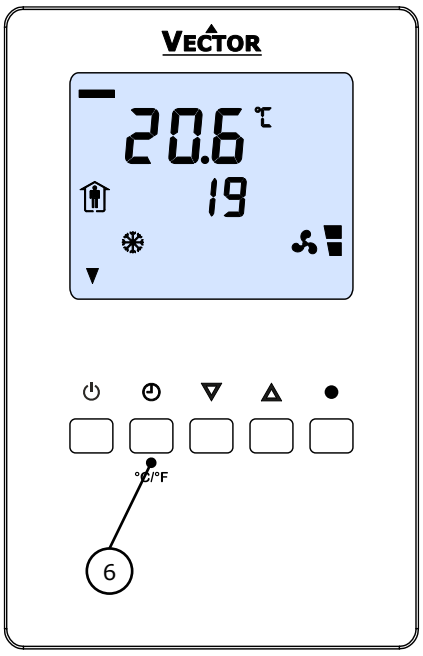
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Display and operation

TCI-W13-U



TCI-W23-U



Pos.	Function / Description
1	**Loop indication** - Standard display (no button pressed for 30 sec.): Not visible - Loop display: Bar at far left = Loop 1, Bar toward right = Loop 2
2	**Operating Mode** - Display of operation mode
3	**Controlling Mode** - Display of control mode
4	**Indicators** - Standard display: Active digital output (arrow at far left=1, toward right=2)
5	**Operating Mode ⍰ (POWER)(Back)** - Press < 2 sec.: Toggle OCCUPIED/UNOCCUPIED mode or switch from OFF to ON - Press > 2 sec.: Turn unit OFF. Text OFF displayed with current time (W23-U) temperature (W13-U) - (Parameter setting: BACK to previous menu) - (Menu navigation: Back to previous/home menu)
6	**OPTION ❄♨, 🕘, °C/°F** - Press > 2 sec.: Enter set-up CLOCK (TCI-W23-U), SCHEDULES (TCI-W23-U), H/C, °C/°F
7	**DOWN ▽ (-)** - Decrease SET POINT - (Parameter setting: SCROLL menu options and parameters)
8	**UP △ (+)** - Increase SET POINT - (Parameter setting: SCROLL menu options and parameters)
9	**RIGHT ● (Calibration) (Enter)** - Press < 2 sec.: Select Control Loop - Press > 2 sec.: Enter sensor calibration - (Parameter setting: ENTER to select menu option, accept parameter change)
10	**Vertical Bar** - Display of input/output value with 10% resolution - (Parameter setting: Displays programming step)
11	**Small Digits** - Display of setpoint, clock or parameter number
12	**Large Digits** - Display of measured room temperature, input or parameter value

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Operating Mode

Display	Description
	**Occupied (Comfort)** - All control functions operating per set points
	**Unoccupied (Economy)** - Set points shifted according to 1L07, 2L07
OFF	**Protection (Energy Hold Off)** - Outputs are off, inputs monitored for alarms

Controlling Mode

Display	Description
	**Cooling** - Cooling (Direct) Active
	**Heating** - Heating (Reverse) Active
	**Manual** - Manual Override
	**Clock / Schedules** - Schedule Set
	**Fan** - Fan Active

Operation Status

Display	Description
	**Alarm** - Alarm active

Standard display (Parameters UP08, UP09, UP10)

- Active when no key has been pressed for 30 seconds.
- Contents may be chosen with parameters.

Loop display

- Active when changing set points.
- Large digits show input value if 1L 27 or 2L 27 = OFF. Small digits show set point.
  If 1L 27 or 2L 27 = ON, only the setpoint is shown in the large digits.
- Vertical bars show analog output value. Arrows in position 1, 2 and/or 3 show active binary (digital) output stages

Display in OFF mode

- When the device is switched off, all enabled input values and the clock are displayed each for 4 seconds on the large LCD digits in a continuous cycle while OFF is displayed in the small digits. To prevent this, make sure that in idle mode no input values are shown on either small or large digits by setting UP09 and UP11 to something else than 1.

Override of secondary set point in cascade control

- If cascade control is active, with variable air volume (VAV) for example, the user can override the primary loop and manually select the set point of the secondary loop-the loop is now changed to constant air volume (CAV). Typically for tuning the VAV system. This feature may be disabled with UP02.
- While the secondary loop is displayed change the set point with UP/DOWN △▽. Override Cascade symbol appears.
- Press OPTION to move back to the temperature loop and cancel cascade override.

Power Failure

- All parameters and set points are automatically saved and do not need to be re-entered.
- Upon return of power: Set *Parameter UP05* to keep the unit off, switch on, or operation mode before power failure.
- Clock and time schedule settings retained for 48 hours (after powered for at least 10 hours).

Alarm messages

Small Digit	LCD Symbol	Alarm Condition
ALA1 – ALA8		Alarm for low/high input or output limits according to configuration.



For details on configuring alarms see input configuration on page , output configuration on page , or auxiliary function.

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Error messages

Large Digit	Error Condition
Err1	An assigned input is not enabled or missing. All control loops, functions and outputs tied to this input will be disabled. Verify input connections, jumper settings and parameter settings for the input involved.
Err3	A function refers to a disabled input. Disable the function or enable the input.
Err4	Internal failure. Product must be replaced.

Manual heat – cool change

To manually change heating or cooling mode press the OPTION key (TCI-W13-U) or (TCI-W23-U) for more than 2 seconds. Access to manual heat – cool change may be disabled with parameter UP03.

For TCI-W13: Press OPTION > 2 sec. SEL and H-C is displayed. For TCI-W23: Press OPTION > 2 sec. SEL and current time is displayed. Press UP until SEL and H-C is displayed. Press RIGHT ● to toggle H or C.	SEL H-C

Display input values

For TCI-W13: Press OPTION > 2 sec. SEL and H-C is displayed. Press UP until UI1 and its value are displayed. For TCI-W23: Press OPTION > 2 sec. SEL and current time is shown. Press UP until UI1 and its value are displayed. Press UP key again to step through the next active input Note: disabled inputs will not be shown.	75% UI 1

Sensor Calibration

Sensor inputs can be calibrated if needed.

Press RIGHT ● > 2 sec. UI and its value is displayed, Press RIGHT ●: Calibration value and tool symbol is displayed, UP/DOWN to calibrate, Press RIGHT ●: Save calibration, tool symbol disappears. Press UP key again to step through the next active input Note: disabled inputs will not be shown.	75% UI 1 0.0% ..UI 1

For details on sensor input calibration see input configuration.

Identification of software version used

Press UP/DOWN △▽ buttons simultaneously for three seconds. The display will show firmware version and revision number.

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Clock operation

TCI-W23-U contains a quartz clock with battery back-up (not available in TCI-W13-U). Up to 8 mode changes based on time and day of the week may be programmed. Also position an output or select a set point directly with a time schedule. A blinking clock indicates that the time has not been set or that the unit has been without power for longer than 48 hours. The time needs to be set to allow time schedules to operate.

Clock setup

Press OPTION > 2 sec. SEL and current time displayed Press RIGHT < 2 sec. to change time, Minutes blink: UP/DOWN to change, RIGHT to save minutes, Hours blink: UP/DOWN to change, RIGHT to save hour, Press RIGHT to save time, DAY1 blinks: UP/DOWN to change, RIGHT to save day (day of the week: DAY1 = Monday)	SEL 00:00 DAY1

Enable/disable time schedules

Press OPTION > 2 sec. SEL and current time displayed Press UP: SEL and PRO displayed, clock symbol blinks Press RIGHT: Time schedule status displayed OFF or ON: Press RIGHT OFF/ ON blinks, UP/DOWN to change, RIGHT to save	SEL PRO 	Pro OFF/ON

Creating time schedules

Step 1: Select a switching time (Up to 8, Pr01–Pr08)

Press UP while PRO-ON displayed: Large digits display Pr01, small digits display 00:00 Press RIGHT: 00:00 blinks Press UP/DOWN to select Pr01switching time from 00:00–23:45 (15 minutes steps) Press RIGHT to save switching time (bar appears indicating step 1 complete): DAY 1 blinks	Pr01 08:00

Step 2: Apply selected switching time (Pr01) to DAY1 (Mon) – DAY 7 (Sun)

While Pr01 is displayed and DAY1 is blinking: Press UP: Activate Pr01 switching time for DAY1 (triangle appears on 1), Press DOWN: Deactivate Pr01 switching time for DAY1(triangle disappears) Press RIGHT to save Pr01 DAY1 (2nd bar indicates step 2 complete): Repeat for DAY2 – DAY7	Pr01 DAY1 ▼ 1 2 3 4 5 6 7

Step 3: Select action for switching time (Pr01+Days)

After Pro1, DAY1–DAY7 is completed (Pro1 switching time activate or deactivate on desired days), press RIGHT again to come to desired action for Pro1. The following options appear in order: No = switching time not active OP = operation mode (select ON (Comfort/Occupied), ECO (Economy/Unoccupied), OFF) L1 = set point of loop 1 (select set point) L2 = set point of loop 2 (select set point) d1 = ON/OFF status of do1 (output must be in manual mode) d2 = ON/OFF status of do2 (output must be in manual mode) A1 = set point (0-100%) of ao1 (output must be in manual mode) Press UP/DOWN to scroll through the 7 possible actions (3rd bar indicates step 3 complete) Press RIGHT to select one	Pr01 no

Step 4: Complete switching event (e.g. Pro1 = 08:00, DAY 1, Occupied mode)

After switching type is set, select characteristic of the action as listed in table above. Available actions blink as you scroll through them: Characteristics of action (e.g. 0–100% for A1) appear (4th bar indicates step 4 complete) Press UP/DOWN to select characteristic of action, RIGHT to complete Repeat for Pr02 - Pr08	Pr01 40.0%

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