**Manuals+** — User Manuals Simplified.



# ICON Procon TVF-450 Flow Batching Controller User Guide

**Contents**

**ICON Procon TVF-450 Flow Batching Controller**

**Quick Start Manual**



Large Bright
LED Display

NORYL Housing



ENC Series
NEMA 4X Enclosure

TVF-450
Flow Batching Controller

Read the user's manual carefully before starting to use the unit. Producer reserves the right to implement changes without prior notice.

## Symbol Explanation

 This symbol denotes especially important guidelines concerning the installation and operation of the device. Not complying with the guidelines denoted by this symbol may cause an accident, damage or equipment destruction.
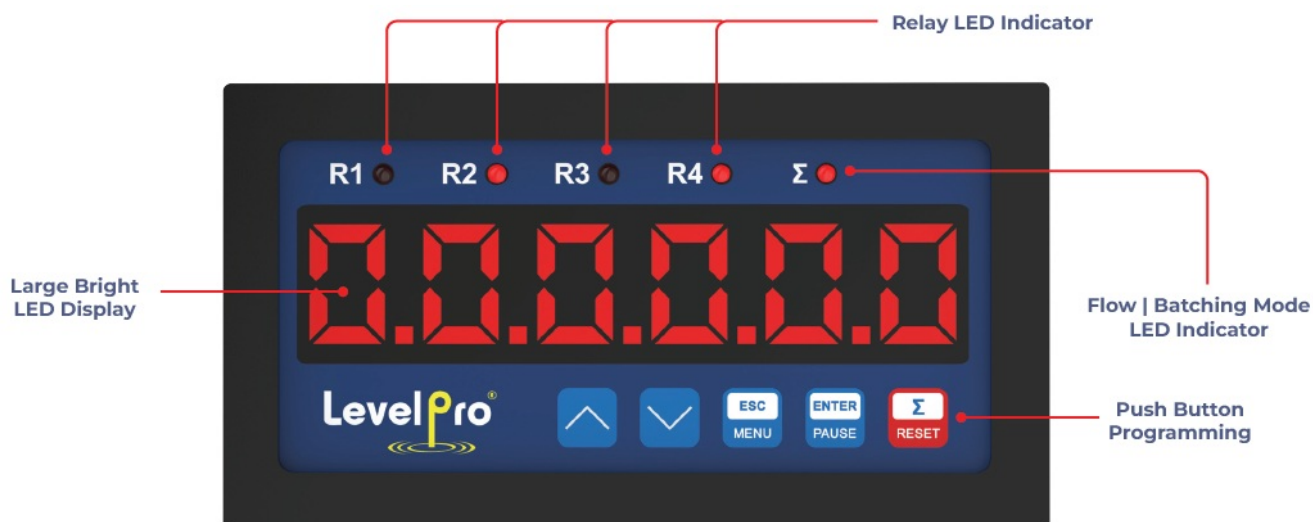
## Basic Requirements | User Safety

- Do not use the unit in areas threatened with excessive shocks, vibrations, dust, humidity, corrosive gasses and oils.
- Do not use the unit in areas where there is risk of explosions.
- Do not use the unit in areas with significant temperature variations, exposure to condensation or ice.
- The manufacturer is not responsible for any damages caused by inappropriate installation, not maintaining the proper environmental conditions and using the unit contrary to its assignment.
- If in the case of a unit malfunction there is a risk of a serious threat to the safety of people or property additional, independent systems and solutions to prevent such a threat must be used.
- The unit uses dangerous voltage that can cause a lethal accident. The unit must be switched off and disconnected from the power supply prior to starting installation of troubleshooting (in the case of malfunction).
- Do not attempt to disassemble, repair or modify the unit yourself. The unit has no user serviceable parts.
- Defective units must be disconnected and submitted for repairs at an authorized service center.

## Specifications

| General | |
|---|---|
| Display | LED \| 6 Digit \| 13mm High \| Red |
| Displayed Values | 0 ~ 999999 |
| RS485 Transmission | 1200…115200 bit/s, 8N1 / 8N2 \| RS485 |
| Housing Material | NORYL |
| Protection Class | NEMA 4X \| IP65 |
| **Input Signal \| Supply** | |
| Standard | Current: 4-20mA \| 0-20mA \| 0-5V* \| 0-10V* |
| Voltage | 85 – 260V AC/DC \| 16 – 35V AC, 19 – 50V DC* |
| **Output Signal \| Supply** | |
| Standard | 2 x Relays (1A) \| 4-20mA + 1 x Relay (1A) |
| Communication | RS485 |
| Voltage | 24VDC |
| Passive current output * | 4-20mA \| (Operating Range Max. 2.8 – 24mA) |
| **Performance** | |
| Accuracy | ±0.1% @ 25°C One Digit |
| **Temperatures** | |
| Operating Temperature | -4 – 122°F \| -20 – 50°C |

## Front Panel Description



Relay LED Indicator

R1  R2  R3  R4  Σ

Large Bright
LED Display

Flow | Batching Mode
LED Indicator

LevelPro®

ESC MENU  ENTER PAUSE  Σ RESET

Push Button
Programming

## Function of Push Buttons

**Symbol used in the manual : [ESC/MENU]**

**Functions:**
- Enter to main menu ( press and hold for at least 3 sec.)
- Exit the current Screen and Enter to previous menu (or measure mode)
- Cancel the changes made in parameter being edited

**Symbol used in the manual : [ENTER/PAUSE]**

**Functions:**
- Start to edit the parameter
- Enter into the sub-menu
- Confirmation of changes made in parameter being edited
- In batcher mode : Pause / Start Batching

**Symbol used in the manual : [ ∑ /RESET]**

**Functions:**
- Switching of the display between total and instantaneous measurements or batcher counter (In batcher mode only)
- Zeroing the currently displayed counter (Press & Hold for at least 2 Sec), the zeroing must be confirmed by pressing **[ENTER]** button

**Symbol used in the manual : [ᐱ] [ᐯ]**

**Functions:**
- Change of the present menu
- Modification of the parameter value
- Switching of the display between relay thresholds and number of batches counter.

## Dimensions
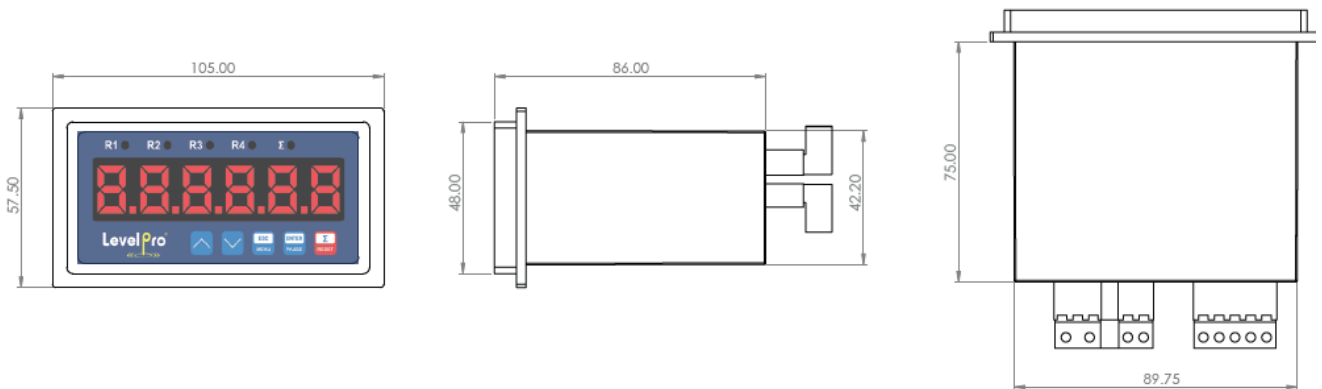


## Wiring Diagram
* Depending on Version 85/230/260V AC/DC ; 50 – 60 Hz 19/24 – 50V DC ; 16/24/35V AC
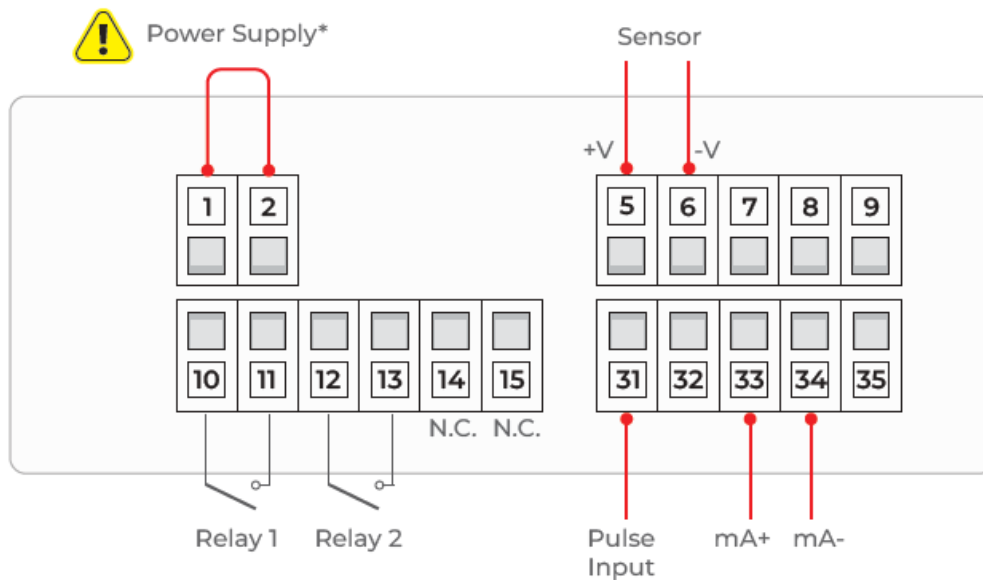
## Wire Connection

- Loosen Set Screw
- Insert Wire
- Tighten Set Screw
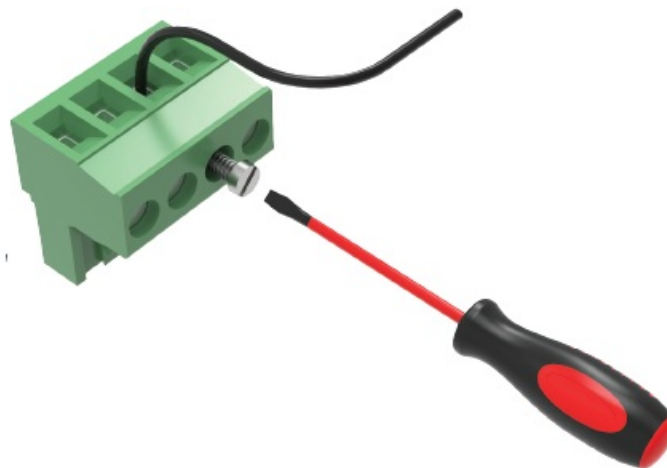


- Due to possible significant interference in industrial installations, appropriate measures assuring correct operation of the unit must be applied.
- The unit is not equipped with an internal fuse or power supply circuit breaker.
- For this reason, an external time-delay cut-out fuse with a small nominal current value must be used (recommended bipolar, max. 2A) and a power supply circuit breaker located near the unit.

## Power Supply & Relay Connection

**Depending on Version**
85/230/260V AC/DC ; 50 - 60 Hz
19/24 - 50V DC ; 16/24/35V AC
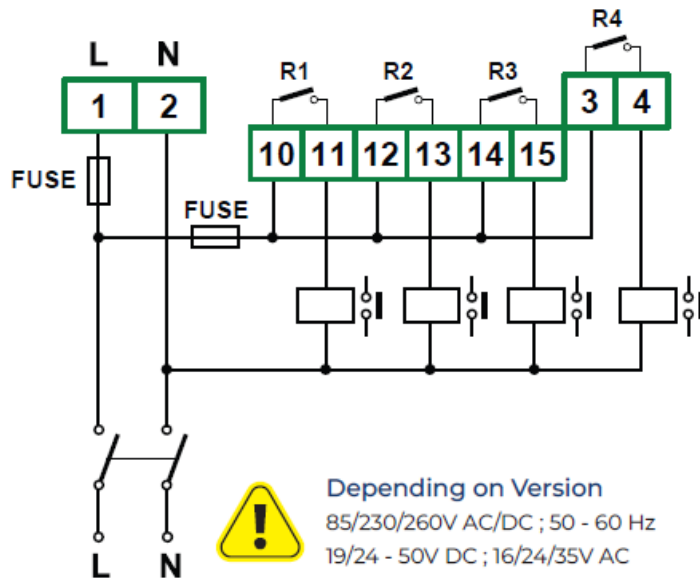
**Note**:
Contacts of relay outputs are not equipped with spark suppressors. When using the relay outputs for switching of inductive loads (coils, contactors, power relays, electromagnets, motors etc.) it is required to use additional suppression circuit (typically capacitor 47nF/ min. 250VAC in series with 100R/5W resistor), connected in parallel to relay terminals or (better) directly on the load.

**Suppression Circuit Connection**
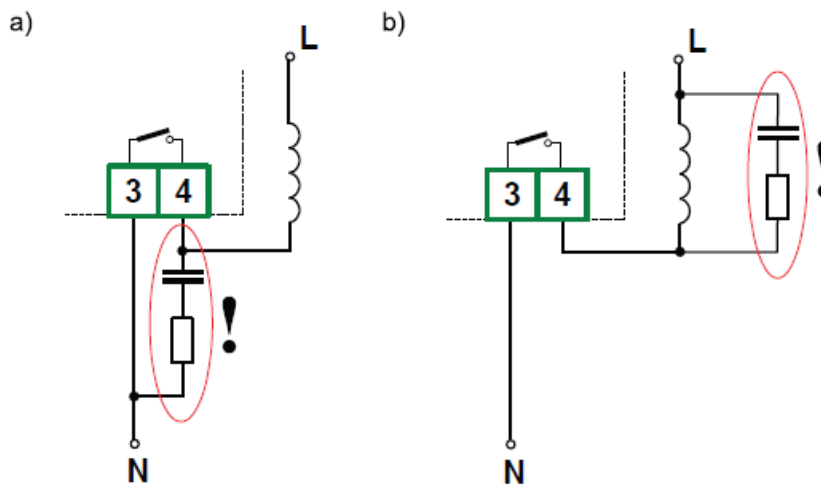


Figure: Examples of Suppression Circuit Connection
a) To Stepper Relay Terminals   b) To the Inductive Load (Motor)

**OC-Type Output Connection***
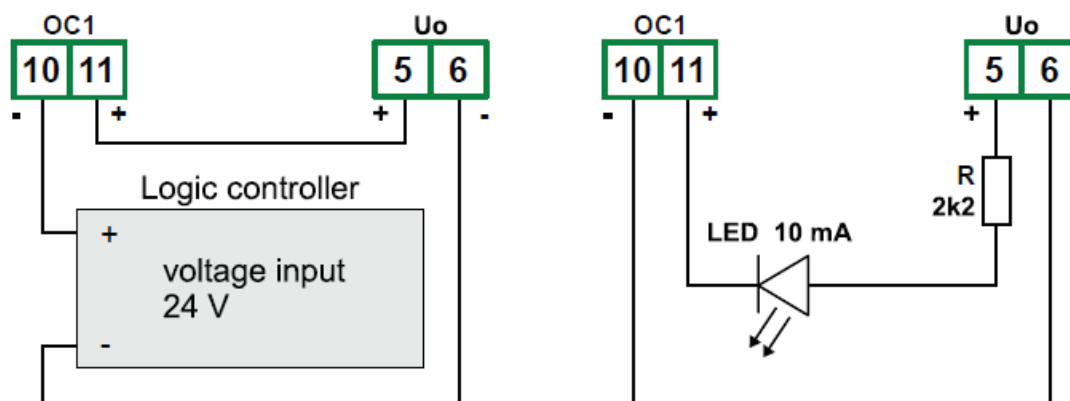
Figure: Examples of OC-type output connection

**Flow Meter Connections**

| TKM Series : 4-20mA Output | | |
|---|---|---|
| 450 Terminal | Wire Color | Description |
| 5 | Brown | +VDC |
| 6 | Blue | -VDC |
| 33 | Yellow | mA+ |
| 34 | Grey | mA- |



| TKS Series : Pulse Output | | |
|---|---|---|
| GPM/Pulse = K factor | | |
| 450 Terminal | Wire Color | Description |
| 5 | Brown | +VDC |
| 6 | Blue | -VDC |
| 31 | Black | NPN Pulse |
| Note : Jump 5 & 35 | | |

| TKW Series : Pulse Output | | |
|---|---|---|
| GPM/Pulse = K factor | | |
| 450 Terminal | Wire Color | Description |
| 5 | Brown | +VDC |
| 6 | Blue | -VDC |
| 31 | Black | Pulse |
| Note : Jump 5 & 35 | | |



| TKW Series : 4-20mA Output | | |
|---|---|---|
| 450 Terminal | Wire Color | Description |
| 5 | Brown | +VDC |
| 6 | Blue | -VDC |
| 33 | Black | mA+ |
| 34 | White | mA- |

| TKM | TKP Series : Pulse Output | | |
|---|---|---|
| GPM/Pulse = K factor | | |
| 450 Terminal | Wire Color | Description |
| 5 | Brown | +VDC |
| 6 | Blue | -VDC |
| 31 | Black | Pulse |
| Note : Jump 5 & 35 | | |



| TIW Series : Pulse Output | | |
|---|---|---|
| GPM/Pulse = K factor | | |
| 450 Terminal | Wire Color | Description |
| 5 | Brown | +VDC |
| 6 | Blue | -VDC |
| 31 | White | Pulse |
| Note : Jump 5 & 35 | | |

| TIM \| TIP Series : Pulse Output | | |
|---|---|---|
| GPM/Pulse = K factor | | |
| 450 Terminal | Wire Color | Description |
| 5 | Brown | +VDC |
| 6 | Blue | -VDC |
| 31 | White | Pulse |
| Note : Jump 5 & 35 | | |



| TIM Series : 4-20mA Output | | |
|---|---|---|
| 450 Terminal | Wire Color | Description |
| 5 | Brown | +VDC |
| 6 | Blue | -VDC |
| 33 | Yellow | mA+ |
| 34 | Grey | mA- |

| UF 1000 \| 4000 \| 5000 – Pulse Output | | |
|---|---|---|
| GPM/Pulse = K factor | | |
| 450 Terminal | Pin | Description |
| 5 | 1 | +VDC |
| 31 | 2 | Pulse |
| 6 | 3 | -VDC |
| Note : Jump 5 & 35 | | |



| UF 1000 \| 4000 \| 5000 – 4-20mA Output | | |
|---|---|---|
| 450 Terminal | Pin | Description |
| 5 | 1 | +VDC |
| 33 | 2 | +mA |
| 6 | 3 | -VDC |
| Note : Jump 6 & 35 | | |

| ProPulse (Flying Lead) – Pulse Output | | |
|---|---|---|
| GPM/Pulse = K factor | | |
| 450 Terminal | Wire Color | Description |
| 5 | Red | +VDC |
| 6 | Shield | -VDC |
| 31 | Blue | Pulse |
| Note : Jump 5 & 35 | | |



| ProPulse®2 – Pulse Output | | |
|---|---|---|
| 450 Terminal | Wire Color | Description |
| 5 | Brown | +VDC |
| 6 | Blue | -VDC |
| 31 | Black | Pulse |
| Note : Jump 5 & 35 | | |
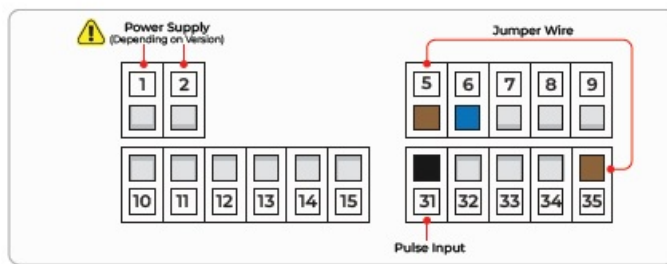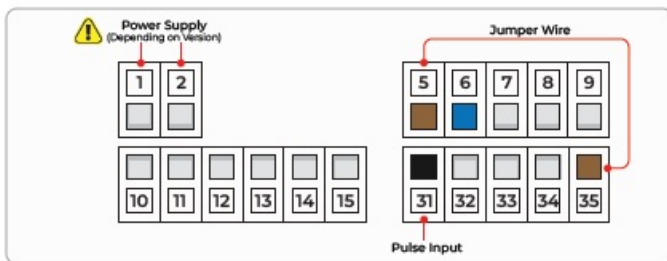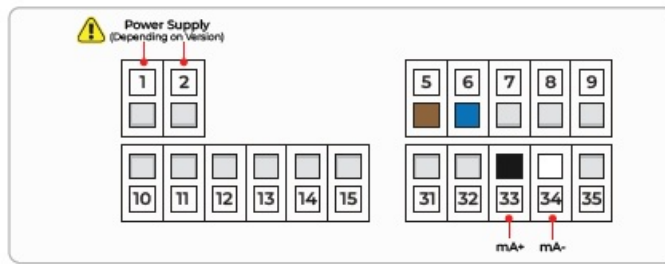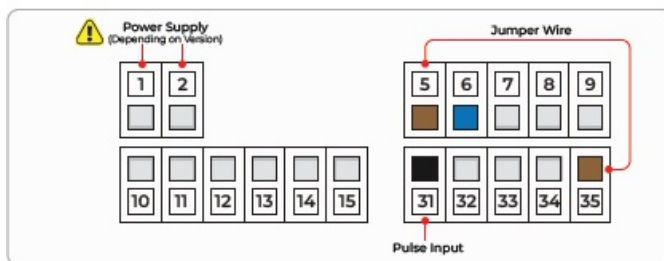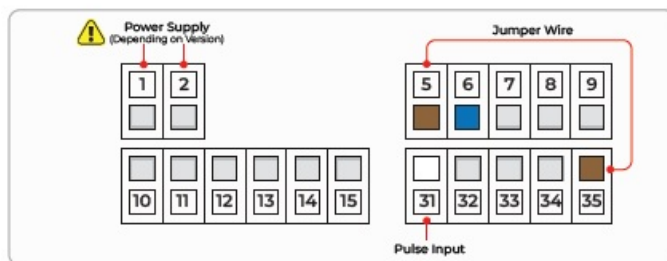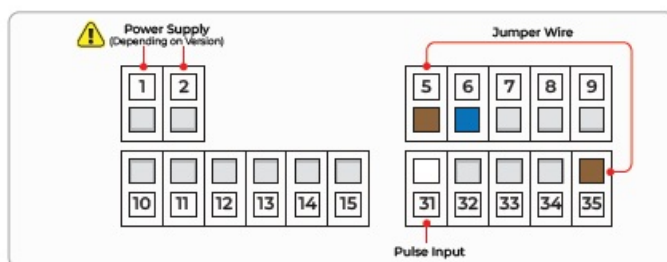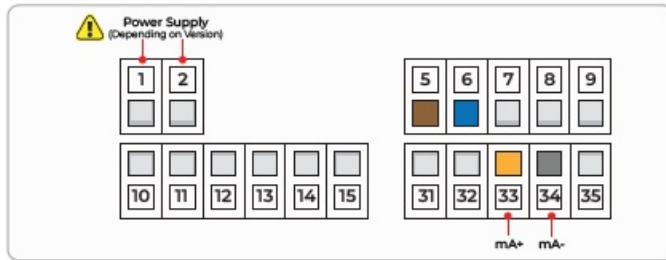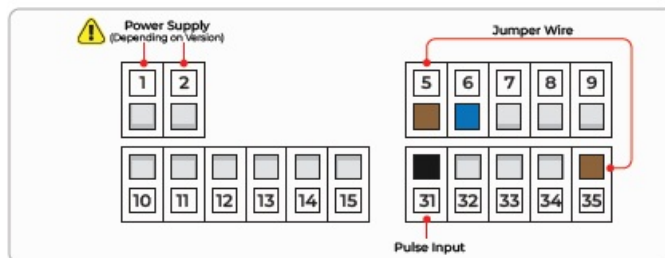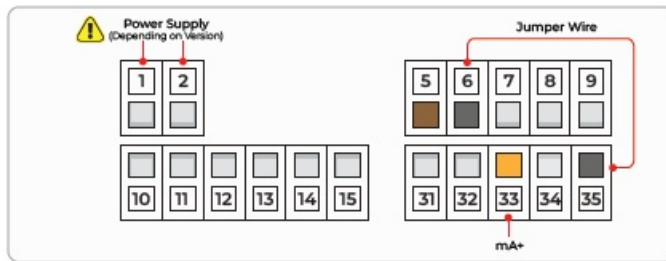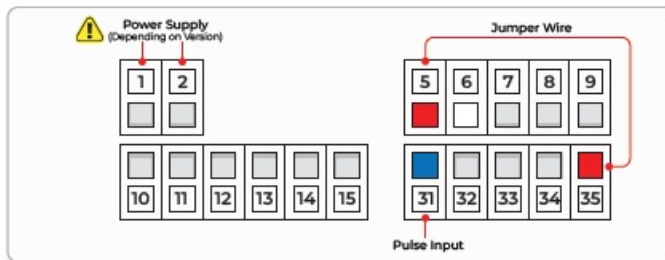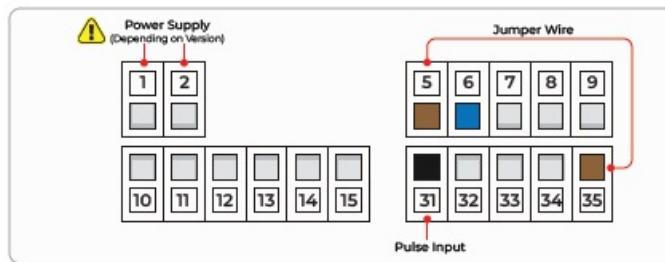
## Programming K Factor

| STEPS | DISPLAY | OPERATION |
|---|---|---|
| **1 Main Display** ► — ESC MENU — 3 SEC | 0.0 | **MAIN DISPLAY** |
| **2 Relay 1** ► — ∨ x5 | rELAY1 | **RELAY 1** Settings |
| **3 Input** ► — ENTER PAUSE | InPUt | **INPUT** Menu |
| **4 K Factor** ► — ENTER PAUSE | PULSEL | Press ∨ or ∧ ➡ Select **PULSEL** (K Factor) |
| **5 K Factor Value** ► — ENTER PAUSE 2 SEC | 000630 | Enter **K FACTOR** Value — Press ∨ or ∧ to change digit. Press ENTER PAUSE to advance to next digit. Note: Enter the K Factor value according to the Flow Unit. Eg: To display flow in GPM, Enter K Factor corresponding to GPM. |
| **6 Save Value** ► — ENTER PAUSE | SEt.? | Save Selection |
| **7 K Factor** ► — ESC MENU | PULSEL | PULSEL |
| **8 Input** ► — ESC MENU | InPUt | Input Menu |
| **9 Main Display** ► | 0.0 | Main Display |

## Programming Relays

| STEPS | DISPLAY | OPERATION |
|---|---|---|
| **1** Main Display ► <br> ESC/MENU 3 SEC | `0.0` | **MAIN DISPLAY** |
| **2** Relay 1 ► <br> ENTER/PAUSE | `rELAY1` | **RELAY 1** Settings |
| **3** Source ► <br> ENTER/PAUSE | `SourCE` | **SOURCE** Menu |
| **4** FLo \| bAt \| tot ► <br> ENTER/PAUSE | `FLo` | Press ∨ or ∧ ➡ Select **FLo** (Flow) |
| **5** Save ► <br> ENTER/PAUSE | `SEt.P.` | Save Selection |

| **6** Source ► <br> ∨ | `SourCE` | Source |
| **7** Set Point 1 ► <br> ENTER/PAUSE | `SEt.P.` | **SET POINT 1** |
| **8** Set Point 1 Value ► <br> ENTER/PAUSE 2 SEC | `0.00050` | Enter **SET POINT 1** Value — Press ∨ or ∧ to change digit · Press ENTER/PAUSE to advance to next digit |
| **9** Save ► <br> ENTER/PAUSE | `SEt.P.` | Save Value |
| **10** Set Point 1 ► <br> ∨ | `SEt.P.` | **SET POINT 1** |

| STEPS | DISPLAY | OPERATION |
|---|---|---|

**11 — Set Point 2** ▸
[ENTER PAUSE]

Display: `SEt P2`

**SET POINT 2\***

\* Option available only when the MODE is set to In/Out

---

**12 — Set Point 2 Value** ▸
[ENTER PAUSE] [🕐 2 SEC]

Display: `000630`

Enter **SET POINT 2** Value

Press [▼] or [▲] to change digit
Press [ENTER PAUSE] to advance to next digit

---

**13 — Save** ▸
[ENTER PAUSE]

Display: `SEt.P.`

Save Value

---

**14 — Set Point 2** ▸
[▼]

Display: `SEt P2`

Set Point 2

---

**15 — Hysterisis** ▸
[ENTER PAUSE]

Display: `HYSt`

**HYSTERISIS** Menu

---

**16 — Hysterisis Value** ▸
[ENTER PAUSE] [🕐 2 SEC]

Display: `000853`

Enter **HYSTERISIS** Value

Press [▼] or [▲] to change digit
Press [ENTER PAUSE] to advance to next digit

---

**17 — Save** ▸
[ENTER PAUSE]

Display: `SEt.P.`

Save Value

---

**18 — Hysterisis** ▸
[▼]

Display: `HYSt`

Hysterisis Menu

---

**19 — Mode** ▸
[ENTER PAUSE]

Display: `ModE`

**MODE** Menu

---

**20 — On | Off | In | Out** ▸
[ENTER PAUSE]

Display: `ot`

Press [▼] or [▲] ➡ Select **On | OFF | In | Out**

| STEPS | DISPLAY | OPERATION |
|---|---|---|
| **21** Save ▸ [ENTER/PAUSE] | `S.Et.P.` | Save Selection |
| **22** Mode ▸ [ESC/MENU] | `n.odE` | Mode Menu |
| **23** Relay 1 ▸ [ESC/MENU] | `r.ELAY1` | Relay 1 Menu |
| **24** Main Display ▸ | `0.0` | Main Display |

## Programming Batching

| STEPS | DISPLAY | OPERATION |
|---|---|---|
| **1** Main Display ▸ [ESC/MENU] 🕐 3 SEC | `0.0` | **MAIN DISPLAY** |
| **2** Relay 1 ▸ [ENTER/PAUSE] | `r.ELAY1` | **RELAY 1** Settings |
| **3** Source ▸ [ENTER/PAUSE] | `S.ourCE` | **SOURCE** Menu |
| **4** FLo \| bAt \| tot ▸ [ENTER/PAUSE] | `bAt` | Press ⌄ or ⌃ ➡ Select **bAt** (Batch) |
| **5** Save ▸ [ENTER/PAUSE] | `S.Et.P.` | Save Selection |
| **6** Source ▸ [⌄] | `S.ourCE` | Source |
| **7** Set Point 1 ▸ [ENTER/PAUSE] | `S.Et. P.` | **SET POINT 1** |
| **8** Set Point 1 Value ▸ [ENTER/PAUSE] 🕐 2 SEC | `0.00050` | Enter **SET POINT 1** Value — Press ⌄ or ⌃ to change digit — Press [ENTER/PAUSE] to advance to next digit |
| **9** Save ▸ [ENTER/PAUSE] | `S.Et.P.` | Save Value |
| **10** Set Point 1 ▸ [⌄] | `S.Et.P.` | **SET POINT 1** |

| STEPS | DISPLAY | OPERATION |
|---|---|---|
| **11** Relay 1 ▸ <br> 👉 [ESC MENU] | `r.ELAY1` | Relay 1 Menu |
| **12** Main Display ▸ <br> 👉 [Σ RESET] | `8.8.8.0.0` | Main Display |
| **13** Batching Mode ▸ <br> 👉 [ENTER PAUSE] to start batching | `8.8.50` | **BATCHING MODE**    ● R1   ● R2   ● Σ <br> **Note:** Switching between Flow rate, Totalizer and Batching can be done by pressing Σ/RESET button. Kind of displayed value is signalised by "Σ" LED. <br> Σ LED ON : Totalizer \| Σ LED OFF: Flow Rate \| Σ LED Pulsing: Batching |

## Programming Output (For 4-20mA Output Models)

| STEPS | DISPLAY | OPERATION |
|---|---|---|
| **1** Main Display ▸ <br> 👉 [ESC MENU] 🕐 3 SEC | `8.8.8.0.0` | **MAIN DISPLAY** |
| **2** Relay 1 ▸ <br> 👉 [∨] ×9 | `r.ELAY1` | Relay 1 Settings |
| **3** Output ▸ <br> 👉 [ENTER PAUSE] | `OutPut` | **OUTPUT** Menu |
| **4** Output Mode ▸ <br> 👉 [ENTER PAUSE] | `Ou.tMod` | **OUTPUT MODE** |
| **5** 4-20mA ▸ <br> 👉 [ENTER PAUSE] | `4-20` | Press [∨] or [∧] ➡ Select **4-20** |
| **6** Save ▸ <br> 👉 [ENTER PAUSE] | `SEt.P.` | Save Selection |
| **6** Save ▸ <br> 👉 [ENTER PAUSE] | `SEt.P.` | Save Selection |
| **7** Output Mode ▸ <br> 👉 [∨] | `Ou.tMod` | Select **OUTPUT MODE** |
| **8** Source ▸ <br> 👉 [ENTER PAUSE] | `S.ourCE` | **SOURCE** Menu |
| **9** FLo \| bAt \| tot ▸ <br> 👉 [ENTER PAUSE] | `FLo` | Press [∨] or [∧] ➡ Select **FLo** (Flow) |
| **10** Save ▸ <br> 👉 [ENTER PAUSE] | `SEt.P.` | Save Selection |

| STEPS | DISPLAY | OPERATION |
|---|---|---|
| **11** Set Point 2 ▸ [ENTER PAUSE] | `SEt P2` | **SET POINT 2\*** <br><br> \* Option available only when the MODE is set to In/Out |
| **12** Set Point 2 Value ▸ [ENTER PAUSE] 2 SEC | `000630` | Enter **SET POINT 2** Value — Press ∨ or ∧ to change digit — Press [ENTER PAUSE] to advance to next digit |
| **13** Save ▸ [ENTER PAUSE] | `SEt.2.` | Save Value |
| **14** Set Point 2 ▸ ∨ | `SEt P2` | Set Point 2 |
| **15** Hysterisis ▸ [ENTER PAUSE] | `HYSt` | **HYSTERISIS** Menu |
| **16** 20mA ▸ [ENTER PAUSE] | `0t H1` | Setting **20mA (HIGH VALUE)** |
| **17** 20mA Value ▸ [ENTER PAUSE] 2 SEC | `000630` | Enter **20mA** Value — Press ∨ or ∧ to change digit — Press [ENTER PAUSE] to advance to next digit |
| **18** Save ▸ [ENTER PAUSE] | `SEt.2.` | Save Value |
| **19** 20mA ▸ [ESC MENU] | `0t H1` | 20mA (High value) |
| **20** Output ▸ [ESC MENU] | `0tPUt` | Output Menu |
| **21** Main Display ▸ | `0.0` | Main Display |

**Resetting Batch**

| STEPS | DISPLAY | OPERATION | |
|---|---|---|---|
| **8** Set Point Value — ENTER/PAUSE 2 SEC | `0.0.0.0.5.0.` | Enter **SET POINT** Value | Press ∨ or ∧ to change digit<br>Press ENTER/PAUSE to advance to next digit |
| **9** Save — ENTER/PAUSE | `0.S E t.P.0.` | Save Value | |
| **10** Set Point — ESC/MENU | `S E t. P.` | Set Point | |
| **11** Relay 1 — ESC/MENU | `r E L A Y 1` | Relay 1 Menu | |
| **12** Main Display — Σ/RESET | `0.0.0.0.0.0.` | Main Display | |
| **13** Batching Mode — ENTER/PAUSE to start batching | `0.0.0.0.5 0.` | **BATCHING MODE** ● R1 ● R2 ● Σ<br>**Note:** Switching between Flow rate, Totalizer and Batching can be done by pressing Σ/RESET button. Kind of displayed value is signalised by "Σ" LED.<br>Σ LED ON : Totalizer \| Σ LED OFF: Flow Rate \| Σ LED Pulsing: Batching |

## Resetting Totalizer

| STEPS | DISPLAY | OPERATION |
|---|---|---|
| **1** Main Display — ESC/MENU 3 SEC | `0.0.0.0.0.0.` | **MAIN DISPLAY** |
| **2** Relay 1 — ∨ X 7 | `r E L A Y 1` | Relay 1 Settings |
| **3** Batch Settings — ENTER/PAUSE | `b A t C H` | **BATCH** Menu |
| **4** Batch Resolution — ∨ X 5 | `b. P r E C` | **BATCH RESOLUTION** |
| **5** Mode Clear — ENTER/PAUSE | `A. C L r` | **MODE CLEAR** |

| STEPS | DISPLAY | OPERATION |
|---|---|---|
| 6 — oFF \| on → (ENTER PAUSE) | `o.n` | Press ∨ or ∧ → Select **on** |
| 7 — Save → (ENTER PAUSE) | `SEt.7` | Save Selection |
| 8 — Mode Clear → (ESC MENU) | `CLr` | Mode Clear |
| 9 — Batch Settings → (ESC MENU) | `bAtCH` | Batch Menu |
| 10 — Main Display → (Σ RESET) | `0.0` | Main Display |

## Setting Decimal Point

| STEPS | DISPLAY | OPERATION |
|---|---|---|
| 1 — Main Display → (ESC MENU) 3 SEC | `0.0` | **MAIN DISPLAY** |
| 2 — Relay 1 → (∨ × 6) | `rELAY1` | Relay 1 Settings |
| 3 — Flow Menu → (ENTER PAUSE) | `FLouu` | **FLOW** Menu * |
| 4 — Flow Precision → (ENTER PAUSE) | `PrEC` | **FLOW PRECISION** |
| 5 — Decimal Point → (ENTER PAUSE) | `0.0` | **DECIMAL POINT** |
| | `0.000` | Press ∨ or ∧ to change Decimcal Point |

| | | |
|---|---|---|
| **6** Save — ENTER/PAUSE | 8.SEt.? | Save Selection |
| **7** Flow Precision — ESC/MENU | F.8 PrEC | Flow Precision |
| **8** Flow Menu — ESC/MENU | FLouu | Flow Menu |
| **9** Main Display | 8.8 0.000 | Main Display |
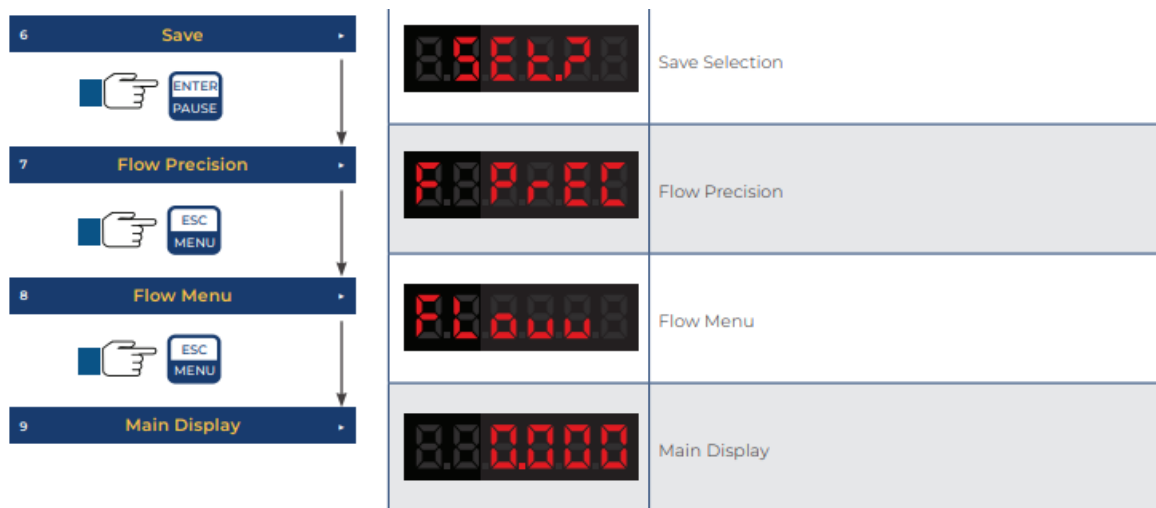
\* To change decimal points for Batch | Totalizer, select Batch | Totalizer Menu

## Warranty, Returns and Limitations

### Warranty

Icon Process Controls Ltd warrants to the original purchaser of its products that such products will be free from defects in material and workmanship under normal use and service in accordance with instructions furnished by Icon Process Controls Ltd for a period of one year from the date of sale of such products. Icon Process Controls Ltd obligation under this warranty is solely and exclusively limited to the repair or replacement, at Icon Process Controls Ltd option, of the products or components, which Icon Process Controls Ltd examination determines to its satisfaction to be defective in material or workmanship within the warranty period. Icon Process Controls Ltd must be notified pursuant to the instructions below of any claim under this warranty within thirty (30) days of any claimed lack of conformity of the product. Any product repaired under this warranty will be warranted only for the remainder of the original warranty period. Any product provided as a replacement under this warranty will be warranted for the one year from the date of replacement.

### Returns

Products cannot be returned to Icon Process Controls Ltd without prior authorization. To return a product that is thought to be defective, go to **www.iconprocon.com**, and submit a customer return (MRA) request form and follow the instructions therein. All warranty and non-warranty product returns to Icon Process Controls Ltd must be shipped prepaid and insured. Icon Process Controls Ltd will not be responsible for any products lost or damaged in shipment.

### Limitations

This warranty does not apply to products which: 1) are beyond the warranty period or are products for which the original purchaser does not follow the warranty procedures outlined above; 2) have been subjected to electrical, mechanical or chemical damage due to improper, accidental or negligent use; 3) have been modified or altered; 4) anyone other than service personnel authorized by Icon Process Controls Ltd have attempted to repair; 5) have been involved in accidents or natural disasters; or 6) are damaged during return shipment to Icon Process Controls Ltd reserves the right to unilaterally waive this warranty and dispose of any product returned to Icon Process Controls Ltd where: 1) there is evidence of a potentially hazardous material present with the product; or 2) the product has remained unclaimed at Icon Process Controls Ltd for more than 30 days after Icon Process Controls Ltd has dutifully requested disposition. This warranty contains the sole express warranty made by Icon Process Controls Ltd in connection with its products.

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If any portion of this warranty is held to be invalid or unenforceable for any reason, such finding will not invalidate any other provision of this warranty.

For additional product documentation and technical support visit: **www.iconprocon.com**

- e-mail: **sales@iconprocon.com** or **support@iconprocon.com**
- Ph: 905.469.9283

Corrosion-Free Instrumentation Equipment

## FAQ

- **What should I do if the unit malfunctions?**

  If the unit malfunctions, disconnect it from the power supply and contact an authorized service center for repairs.

- **Can I use the unit in areas with explosive risks?**

  Avoid using the unit in areas with a risk of explosions to ensure safety and prevent damage to the equipment.

- **How do I ensure correct operation in industrial installations?**

  Appropriate measures should be applied to minimize interference and ensure the correct operation of the unit in industrial settings.

## Documents / Resources



**ICON Procon TVF-450 Flow Batching Controller** [pdf] User Guide
TVF-450 Flow Batching Controller, TVF-450, Flow Batching Controller, Batching Controller, Controller

## References

- **User Manual**