

**BECKHOFF**



PLC Languages    IEC61131-3 3<sup>rd</sup> Edition

- ST – Structured Text
- FBD – Function Block Diagram
- LD – Ladder Diagram
- SFC – Sequential Function Chart
- IL – Instruction List (Depreciated)
  
- CFC – Continuous Function Chart
  - Not part of the IEC standard

- Structured Text is a high level language which has a similar syntax to PASCAL
- ST is best for complex mathematical equations and iterations (loops)

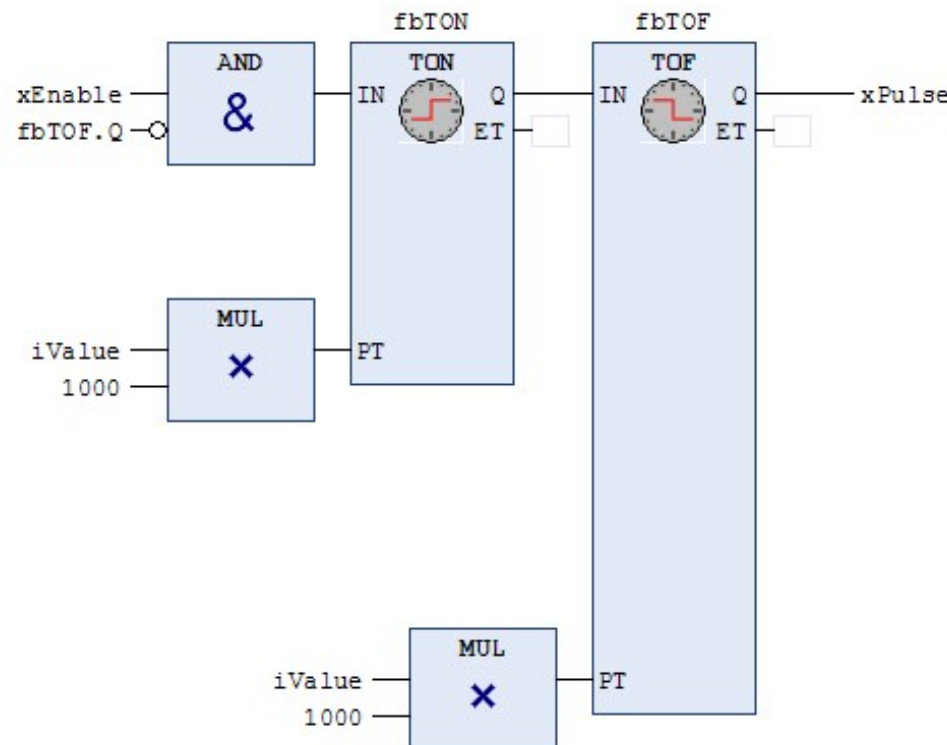
```
x := (-b + SQRT( (b*b) - 4*a*c) ) / 2*a;
```

```
FOR i := 1 TO 10 DO  
    myArray[i] := fbPulse[i].xPulse;  
END_FOR
```

# PLC Languages – Function Block Diagram

BECKHOFF

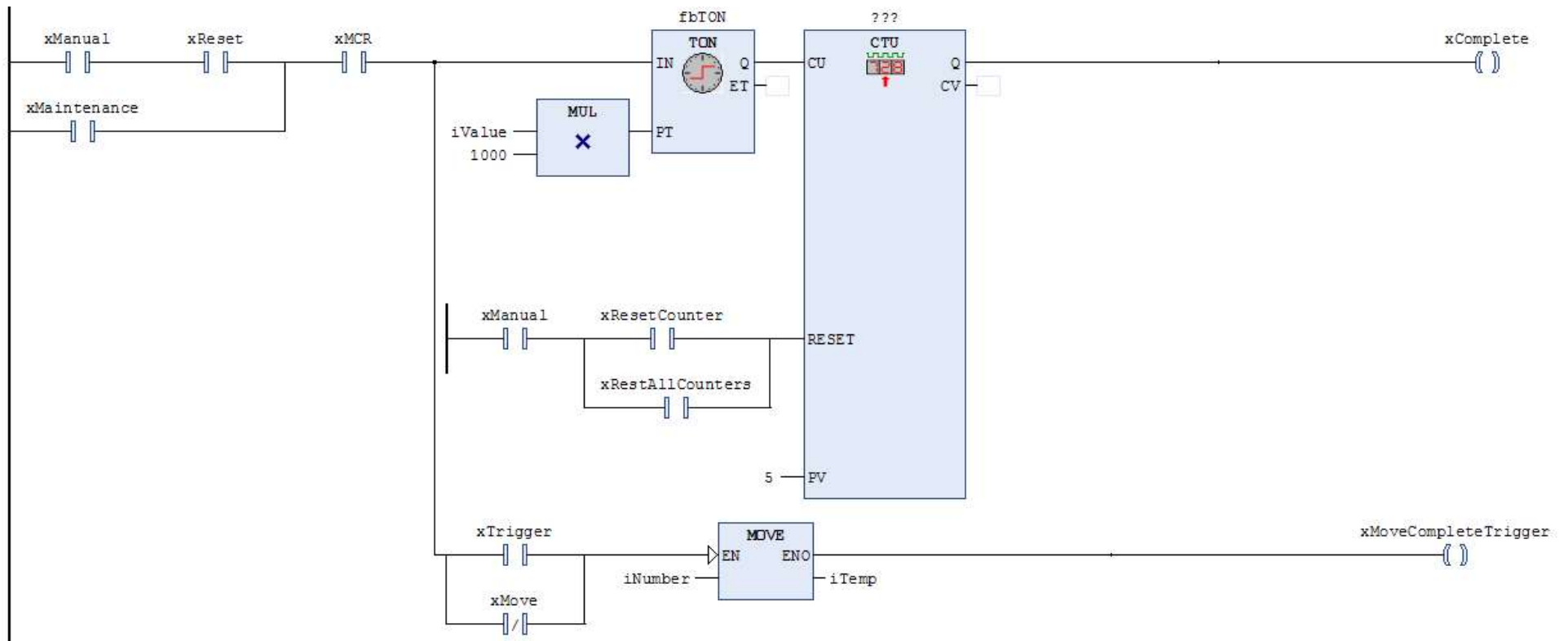
- Function Block Diagram is based on viewing a system in terms of the flow of signals between processing elements.
- FBD is very similar to an electronic circuit diagram.
- Typical use of FBD is to describe controls loops and logic.



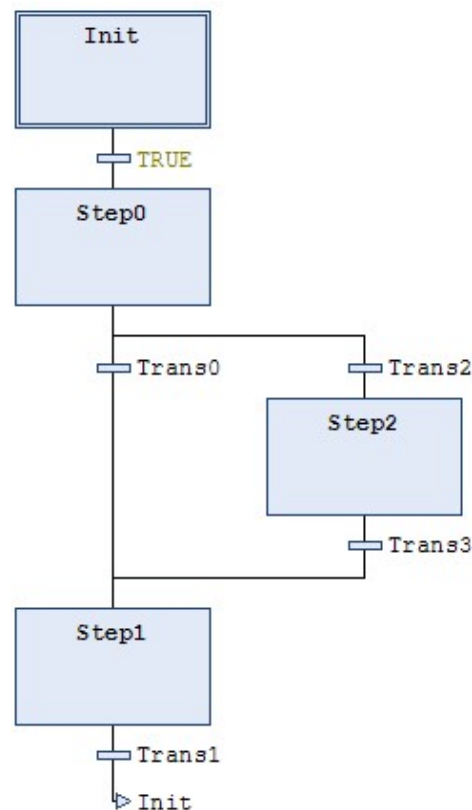
# PLC Languages – Ladder Diagram

BECKHOFF

- Ladder Diagram is based on a technique used to design logic using relays. A Ladder diagram always has a power rail on the left side which supplies power to the contacts on the rung.



- Sequential Function Chart is used in describing the behavior of a system in terms of states and transitions.
- SFC allows the sequential aspects of a control program to be described.



# PLC Languages – Instruction List (Deprecated)

BECKHOFF

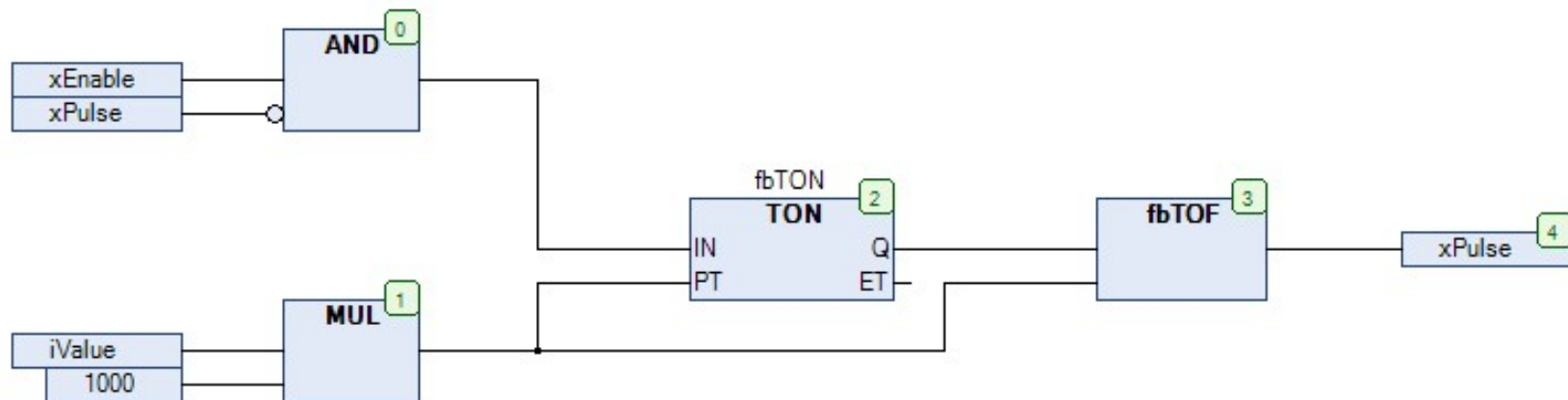
- Instruction List is a low level language which is similar in structure to an assembly language
- This language has since been deprecated it still exists in TwinCAT but is disabled by default

|   |        |          |
|---|--------|----------|
| 1 | LD     | xInc     |
|   | JMPCN  | Cont     |
| 2 | LD     | Speed    |
|   | ADD    | 5        |
|   | ST     | NewSpeed |
| 3 | Cont : |          |
|   | LD     | xInput   |
|   | ST     | xOutput  |

# PLC Languages Continuous Function Chart

BECKHOFF

- Continuous Function Chart is not a part of the IEC standard but is included in TwinCAT
- CFC is similar to FBD, the difference is that FBD is separated into rungs and CFC is all on one piece of paper. The order of operation is designated by the block number.



## **Beckhoff Automation GmbH & Co. KG**

Headquarters  
Huelshorstweg 20  
33415 Verl  
Germany

Phone: +49 5246 963-0  
Fax: +49 5246 963-198  
E-Mail: [info@beckhoff.com](mailto:info@beckhoff.com)  
Web: [www.beckhoff.com](http://www.beckhoff.com)

© Beckhoff Automation GmbH & Co. KG

All images are protected by copyright. The use and transfer to third parties is not permitted.

Beckhoff®, TwinCAT®, EtherCAT®, Safety over EtherCAT®, TwinSAFE®, XFC® and XTS® are registered trademarks of and licensed by Beckhoff Automation GmbH. Other designations used in this presentation may be trademarks whose use by third parties for their own purposes could violate the rights of the owners.

The information provided in this presentation contains merely general descriptions or characteristics of performance which in case of actual application do not always apply as described or which may change as a result of further development of the products. An obligation to provide the respective characteristics shall only exist if expressly agreed in the terms of contract.

## **Beckhoff Automation GmbH & Co. KG**

Unternehmenszentrale  
Hülshorstweg 20  
33415 Verl  
Deutschland

Telefon: +49 5246 963-0  
Fax: +49 5246 963-198  
E-Mail: [info@beckhoff.de](mailto:info@beckhoff.de)  
Web: [www.beckhoff.de](http://www.beckhoff.de)

© Beckhoff Automation GmbH & Co. KG

Alle Bilder sind urheberrechtlich geschützt. Die Weitergabe und Nutzung durch Dritte ist nicht gestattet.

Beckhoff®, TwinCAT®, EtherCAT®, Safety over EtherCAT®, TwinSAFE®, XFC® und XTS® sind eingetragene und lizenzierte Marken der Beckhoff Automation GmbH. Die Verwendung anderer in dieser Präsentation enthaltenen Marken oder Kennzeichen durch Dritte kann zu einer Verletzung von Rechten der Inhaber der entsprechenden Kennzeichen führen.

Die Informationen in dieser Präsentation enthalten lediglich allgemeine Beschreibungen bzw. Leistungsmerkmale, welche im konkreten Anwendungsfall nicht immer in der beschriebenen Form zutreffen bzw. welche sich durch Weiterentwicklung der Produkte ändern können. Die gewünschten Leistungsmerkmale sind nur dann verbindlich, wenn sie bei Vertragsabschluss ausdrücklich vereinbart werden.