# FDS Example

## Description

|  |
| --- |
| This some general description in a comment table.  This is a new line in the description. |

|  |
| --- |
| This is another comment table without borders.  This is a new line in the 2nd table |

## Linked Modules

Keep empty line at start and end to test if blank lines don't lead to problems

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **EM\_Connection\_Type** | **Comment** |
|  |  |  |  |
| XV003 | Valve |  |  |
| XV004 | Valve |  |  |
| XV005 | Valve |  |  |
| P001 | Motor |  | test a CM |
| P002 | Motor |  | test a CM where the casing doesn't match an existing type |
| EM\_I\_OUT | EM\_I\_OUT | fixed |  |
| LT001 | AI |  |  |
| LT002 | AI |  |  |
| FIC001 | PID |  |  |
| Some\_Dyn\_EM | EM\_I\_OUT | dynamic\_external | An example of an EM that's dynamically linked to the phase |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

## Inputs

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Comment** | **Enum** |
| Bool1 | Bool |  |  |
| Bool2 | Bool |  |  |
| DB\_NO | Int |  |  |

## Outputs

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Comment** | **Enum** |
|  |  |  |  |
| Destination | Int |  | enum\_units |
| setpoint | Real |  |  |
| some\_bool\_out | Bool |  |  |
|  |  |  |  |

## In\_Outs

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Comment** | **Enum** |
|  |  |  |  |

## Internal Values

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Comment** | **Enum** |
| e | Real |  |  |
| f | Real |  |  |
| g | Real |  |  |
| h | Real |  |  |
| ii | Real |  |  |
| j | Real |  |  |
| k | Real |  |  |
| l | Real |  |  |
| mm | Real |  |  |
| n | Real |  |  |
| o | Real |  |  |
| pp | Real |  |  |
| qq | Real |  |  |
| rr | Real |  |  |
| ss | Real |  |  |
| tt | Real |  |  |
| u | Real |  |  |
| v | Real |  |  |
| ww | Real |  |  |
| xx | Real |  |  |
| y | Real |  |  |
| z | Real |  |  |
| foo | Real |  |  |
| bar | Real |  |  |
| stoplevel | Real |  |  |
| startlevel | Real |  |  |
| offset | Real |  |  |
| var1 | Real |  |  |
| test1 | Real |  |  |
| test2 | Real |  |  |
| intvar | Int |  |  |

## Recipy Parameters

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **#** | **Parameter** | **Comment** | **Min.** | **Value** | **Max.** | **Unit** | **Enum** |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

## HMI Parameterlist

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **#** | **Parameter** | **Comment** | **Min.** | **Value** | **Max.** | **Unit** | **Enum** |
|  |  |  |  |  |  |  |  |
|  | hmi\_par\_without\_unit |  |  |  |  |  |  |
|  | timesetting |  |  |  |  | h |  |
|  |  |  |  |  |  |  |  |

## HMI Settings

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **#** | **Parameter** | **Comment** | **Min.** | **Value** | **Max.** | **Unit** | **Enum** |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

## Instances

|  |  |  |  |
| --- | --- | --- | --- |
| **Instance** | **LT001** | **LT002** | **FIC001** |
| phase\_1 | LT100 | LT200 | FIC100 |
| phase\_2 | LT101 | LT201 | FIC101 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Instance** | **Controller** | **FC** | **DB** | **Comment** |
| phase\_1 | PLC1 | auto | auto | First instance of fds\_example |
| phase\_2 | PLC1 | auto | auto | Second instance of fds\_example |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Instance** | **XV003** | **XV004** | **XV005** | **P001** | **P002** | **EM\_I\_OUT\_ID** | **Unit** |
| phase\_1 | XV300 | XV400 | XV500 | P100 | P200 | EM\_I001\_OUT | R100 |
| phase\_2 | XV301 | XV401 | XV501 | P101 | P201 | EM\_I002\_OUT | R101 |

## Run-sequence

| **Step** | **Actions** | **Transitions** | **Next Step** |
| --- | --- | --- | --- |
| 0 | **// Test step with only a comment and transition** |  | 10 |
| 10 | **// Test multiple comments**  **// this is another line** |  | 20 |
| 20 | **// Test some spacing before the comment**  **// Test some spacing before the first comment word** |  | 30 |
| 30 | **// test a simple assignment with a variable**  e = f |  | 40 |
| 40 | **// test a simple assignment with a REAL**  setpoint = 25.0 |  | 50 |
| 50 | **// test a simple assignment with some BOOLS**  XV003\_CMD = true  XV004\_CMD = false |  | 70 |
| 70 | **// test opening a valve**  open XV003 |  | 80 |
| 80 | **// test closing a valve**  close XV003 |  | 90 |
| 90 | **// test starting a motor**  start P001 |  | 100 |
| 100 | **// test stopping a motor**  stop P001 |  | 120 |
| 120 | **// test with some spaces and non-matching casing => should still work**    Open XV003 |  | 130 |
| 130 | **// test enumeration**  Destination = PF-I-02 |  | 150 |
| 150 | **// test EM command**  EM\_I\_OUT = Pump\_Fixed\_Pressure |  | 170 |
| 170 | **// test some simple calculations**  xx = y \* z  rr = e / 2.0  g = h + ii  j = k – mm  n = o + 3.4  pp = 7.3 / qq |  | 180 |
| 180 | **// test complex calculations**  rr = (ss + tt) / u \* v / (ww – xx + 1.34) + 2.3  foo = bar + 1.0  stoplevel = startlevel + setpoint – offset |  | 190 |
| 190 | **// add two REALs**  var1 = 3.0+2.0 |  | 200 |
| 200 | **// test first and last scan actions**  [first scan]  xx = 1.0  [continuous]  y = 2.0  [last scan]  z = 3.0 |  | 230 |
| 230 | **// test a transition with calculation** | LT001 >= startlevel + setpoint – offset | 250 |
| 250 | **// test natural language transition** | P001 running | 260 |
| 260 | **// test enumeration** | Destination = PF-I-04 | 280 |
| 280 | **// test enumerated status of EM** | EM\_I\_OUT = Pump\_Fixed\_Pressure | 300 |
| 300 | **// test if primary suffixes are detected** | 2.0 \* LT001 = (LT001 + LT001 – LT001) \* LT001 | 310 |
| 310 | **// test primary suffixes in action side**  test1 = (LT001 + LT001 – LT001) \* LT001  test2 = LT002 |  | 320 |
| 320 | **// test with AND in front** | AND XV003 opened | 330 |
| 330 | **// test multiple conditions without explicit logic** | XV003 opened  XV004 opened | 340 |
| 340 | **// test multiple conditions with logic** | AND XV003 opened  AND XV004 opened | 350 |
| 350 | **// test OR-logic** | OR XV003 opened  OR XV004 opened | 360 |
| 360 | **// test combined logic** | AND XV005 opened  AND(  OR XV003 opened  OR XV004 opened  ) | 370 |
| 370 | **// test improved readability** | AND XV005 opened  AND(  OR XV003 opened  OR XV004 opened  ) | 420 |
| 420 | **// test first line without logic and rest with AND** | XV003 opened  AND XV004 opened  AND XV005 opened | 430 |
| 430 | **// test first line without logic and rest with OR** | XV003 opened  OR XV004 opened  OR XV005 opened | 440 |
| 440 | **// test button** | button “continue” | 450 |
| 450 | **// test button with capital => no problem, the button is case insensitive** | Button “ok” | 460 |
| 460 | **// test button without opening quotation marks => no problem, any marks are just removed** | button cancel” | 470 |
| 470 | **// test button without closing quotation marks => no problem, any marks are just removed** | button “go back | 480 |
| 480 | **// test 3 buttons** | button “continue”  button “cancel”  button “go back” | 490 |
| 490 | **// test 4 buttons => not foreseen in the template, so should log an error** | button “continue”  button “cancel”  button “go back” | 510 |
| 510 | **// test message**  message “add the manual ingredients” |  | 520 |
| 520 | **// test falseword with two words in transition** | XV003 not opened | 530 |
| 530 | **// test trueword with multiple words in action**  move to open position XV003 |  | 540 |
| 540 | **// test putting controller in auto with pulseword**  FIC001 auto |  | 550 |
| 550 | **// test putting controller in auto with pulseword consisting of multiple words**  FIC001 switch to auto |  | 560 |
| 560 | **// test with pulseword in front**  auto FIC001 |  | 570 |
| 570 | **// test with pulseword in front**  switch to auto FIC001 |  | 580 |
| 580 | **// test steptime in s** | steptime > 2.0s | 590 |
| 590 | **// test steptime in m** | steptime > 1.50m | 600 |
| 600 | **// test steptime in h** | steptime > 4.3h | 610 |
| 610 | **// test steptime with unit separated by space => still works (because it takes the last character)** | steptime > 1.50 m | 640 |
| 640 | **// test steptime with variable with unit** | steptime > timesetting | 650 |
| 650 | **// reset a timer**  reset timer\_dosing |  | 660 |
| 660 | **// start a timer**  start timer\_mixing |  | 670 |
| 670 | **// pause a timer**  pause timer\_circulation |  | 680 |
| 680 | **// test timer in m** | timer\_dosing >= 5.2 m | 690 |
| 690 | **// test timer with variable with unit** | timer\_circulation < timesetting | 700 |
| 700 | **// test putting a controller in manual**  FIC001 manual |  | 710 |
| 710 | **// test putting a controller in manual while changing the output value**  FIC001 manual 20.0 |  | 720 |
| 720 | **// test putting a controller in manual while changing the output value that has a unit**  FIC001 manual 20.0 Hz |  | 730 |
| 730 | **// without space**  FIC001 manual 20.0Hz |  | 740 |
| 740 | **// put PID controller in auto**  FIC001 auto |  | 750 |
| 750 | **// auto with setpoint**  FIC001 auto 80.0% |  | 760 |
| 760 | **// internal mode**  FIC001 internal |  | 770 |
| 770 | **// internal mode with value**  FIC001 internal 80.0 |  | 780 |
| 780 | **// value with unit**  FIC001 internal 80.0 % |  | 790 |
| 790 | **// without space**  FIC001 internal80.0% |  | 810 |
| 810 | **// external mode**  FIC001 external |  | 820 |
| 820 | **// test direct access to a CM instance in dot-format in the assignment => should convert to suffix**  XV008.AUT\_OP = true |  | 830 |
| 830 | **// test direct access to a CM in dot-notation in the evaluation => should convert to suffix** | XV008.QOPEN = true | 840 |
| 840 | **// test dot-format to Linked CM in assignment => should convert to suffix**  XV003.AUT\_OP = true |  | 850 |
| 850 | **// test dot-format from Linked CM in evaluation =>should convert to suffix** | XV003.QOPEN = true | 860 |
| 860 | **// test direct access to an EM instance in dot-format in the assignment => should stay in dot-format**  EM\_Instance\_4.Pressure\_SP = 4.2 |  | 870 |
| 870 | **// test direct access to a EM in dot-notation in the evaluation => should stay in dot-format** | EM\_Instance\_4.Level >= 50.0 | 880 |
| 880 | **// test dot-format to Linked EM in assignment => should stay in dot-format**  Some\_Dyn\_EM.Pressure\_SP = 4.2 |  | 890 |
| 890 | **// test dot-format from Linked EM in evaluation =>should stay in dot-format** | Some\_Dyn\_EM.Level >= 50.0 | 910 |
| 910 | **// test suffix-format to Linked EM in assignment => should convert to dot-format**  // Some\_Dyn\_EM\_P\_SP = 4.3  // Not longer supported: only support dot notation because it is more natural to use. Keep it simple. |  | 920 |
| 920 | **// test suffix-format from Linked EM in evaluation =>should convert to dot-format**  **// Cancelled support for this: simplify and only allow dot format** | // Some\_Dyn\_EM\_LT >= 50.0 | 930 |
| 930 | **// write a bool**  some\_bool\_out = true |  | 940 |
| 940 | **// test absolute value calculation**  test1 = abs(2.3)  test2 = abs(test1) |  | 950 |
| 950 | **// test absolute value calculation to int value**  intvar = abs(4.6)  intvar = abs(test1)  intvar = intvar + (intvar+ abs(3.2)) |  | 960 |
| 960 | **// test absolut function of another calc**  test1 = abs(test1 + test2) |  | 970 |
| 970 | **// test multiple transitions in one step** | foo > 1.0 | 980 |
| foo <= 1.0 | 990 |
| 980 | **// assignment where the right part is a boolean variable**  Bool1 = Bool2 |  | 990 |
| 990 | **// comparison where the right part is a boolen variable** | Bool1 = Bool2 | 1000 |
| 1000 | **// function call**  write\_to\_DB\_DW (50, 20, 123)  write\_to\_DB\_DW (DB\_NO, 20, 123)  intvar = somefunction(34,32) |  | 0 |

## Hold-Abort-Stop sequence

|  |  |  |  |
| --- | --- | --- | --- |
| **Step** | **Actions** | **Transitions** | **Next Step** |
| 8000 | **// Holding** |  | 8990 |

## Start- and Holdconditions

|  |  |  |  |
| --- | --- | --- | --- |
| **Condition** | **Startcond.** | **Holdcond.** | **Steps** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |