# Chapter 28 FESTO

Recent acquisition of a 5 station Festo manufacturing system has given good examples of many concepts previously discussed in the text. Foremost is the state diagram concept. Also, graphic language – state diagram programming is examined. The pictures below give a visual of the stations in the manufacturing system.



The programs for these sections can be found by downloading the program from the Lab Text Book – Festo Stations 1500 States – Program. The programs are in the list of programs found here. They are:

| Device 1 (Left most)    | IP: 192.168.1.1 | 01VE-AS-1500 |
|-------------------------|-----------------|--------------|
| Device 2 (Second Left)  | IP: 192.168.1.1 | 02PR-AS-1500 |
| Device 3 (Middle)       | IP: 192.168.1.1 | 03BE-AS-1500 |
| Device 4 (Second Right) | IP: 192.168.1.1 | 09SO-AS-1500 |
| Device 5 (Right most)   | IP: 192.168.1.1 | 04HA-AS-1500 |

The alternate approach and the one encouraged is to configure the following processor.



Adding digital and analog cards results with the following. Then compile the blank program and download to the processor. This sets up a blank processor with full capability.



Then look at the Tag list and find the I and Q variables. Then use these variables to turn on the outputs and observe how the inputs function. From there, provide a sequential program to control the section.

| P    | LC tags | •  |                       |           |              |        |  |          |        |          |  |
|------|---------|--|-----------------------|-----------|--------------|--------|--|----------|--------|----------|--|
|      | Na      | me   | Tag table             | Data type | Address      | Retain | Acces  | Writa    | Visibl | Supervis | Comment  |
| 1    | -611    | Em_Stop  | STEP7 classic sy 💌    | Bool 🔳    | %11.5        |        |  |          |        |          | NOT-AUS entriegelt / Emergency stop unlocked   |
| 2    | -671    | CycleEnd   | STEP7 classic symb    | Bool      | %M44 3       |        |  |          |        |          | Zyklusende / Cycle end   |
| -    | -       | 454  | STEPT classic symbols | Deel      |              |        |  |          | ä      |          | s h iv po (sus po  |
| 3    | -400    | 4Step20  | SIEP/ classic symb    | 8001      | %///42.3     |        |  |          |        |          | Schritt 207 Step 20  |
| 4    |         | 4Step19  | STEP7 classic symb    | Bool      | %M42.2       |        |  |          |        |          | Schritt 19 / Step 19   |
| 5    |         | 4Step10  | STEP7 classic symb    | Bool      | %M41.1       |        |  |          |        |          | Schritt 10 / Step 10   |
| 6    | -61     | 4Step09  | STEP7 classic symb    | Bool      | %M41.0       |        |  |          |        |          | Schritt 9 / Step 9   |
| -    | -       | 164-200  | CTT D7 also also and  | Deal      | N1407        |        |  |          | B      |          | Cabrin 0 / Case 0  |
| /    | -111    | 4Stepu6  | SIEF/ classic symb    | 6001      | 76IVHU.7     |        |  | <b>M</b> |        |          | schnitt 67 step 6  |
| 8    |         | 4Step07  | STEP7 classic symb    | Bool      | %M40.6       |        |  |          |        |          | Schritt 7 / Step 7   |
| 9    | -60     | P_Edge1  | STEP7 classic symb    | Bool      | %M45.1       |        |  |          |        |          | Flankenmerker / Edge flag  |
| 10   | -60     | 2M1  | STEP7 classic symb    | Bool      | %00.2        |        |  |          |        |          | Greifer ausfahren / Extend gripper   |
| 11   |         | 282  | CTER7 eleverie ermele | Real      | 810.5        |        |  |          | ä      |          | Conifer aligned for here a Colone and the stand  |
|      | -011    | 282  | SIEP/ classic symb    | 8001      | %10.5        |        |  |          |        |          | Greifer eingefahren / Gripper retracted  |
| 12   |         | 281  | STEP7 classic symb    | Bool      | %10.4        |        |  |          |        |          | Greifer ausgefahren / Gripper extended   |
| 13   |         | 1M2  | STEP7 classic symb    | Bool      | %Q0.1        |        |  |          |        |          | Handhabung zu Folgestation / Handling to downstream station  |
| 14   | -671    | 4Step02  | STEP7 classic symb    | Bool      | %M40.1       |        |  |          |        |          | Schritt 2 / Step 2   |
| 10   | -       | 154  | CTT D7 aleasis surely | Deal      | N1400        |        |  |          | B      |          | Cabrin 1 (Case 1   |
| 15   | -111    | 4Step01  | SIEF/ classic symb    | 6001      | 761040.0     |        |  | <b>M</b> |        |          | schnitt i / step i   |
| 16   |         | 3M1  | STEP7 classic symb    | Bool      | %Q0.3        |        |  |          |        |          | Greifer öffnen / Open gripper  |
| 17   |         | 381  | STEP7 classic symb    | Bool      | %I0.6        |        |  |          |        |          | Werkstück ist nicht schwarz / Workpiece is not black   |
| 18   | -60     | Var4   | STEP7 classic symb    | Byte      | %MR42        |        |  |          |        |          | Variable / variables   |
| 10   | -       | 10.0   | CTT DT alsos is sum h | D to      | NA 10 44     |        |  |          | 8      |          |  |
| 19   | -011    | vars   | SIEP/ classic symb    | Byte      | 76IVIB41     |        |  | Market 1 |        |          | variable / variables   |
| 20   |         | Var2   | STEP7 classic symb    | Byte      | %MB40        |        |  |          |        |          | Variable / variables   |
| 21   | -60     | Var1   | STEP7 classic symb    | Byte      | %MB44        |        |  |          |        |          | Variable / variables   |
| 22   | -570    | 4Step18  | STEP7 classic symb    | Bool      | %M42.1       |        |  |          | Ā      |          | Schritt 18 / Step 18   |
| 22   |         | 4540910  | CTED7 elessis surch   | Deal      | NAM2.0       |        |  |          | H      |          | Schitt 17/Step 17  |
| 25   | -011    | 4Step17  | STEF7 Classic symb    | 6001      | 7610/42.0    |        |  | <b>M</b> |        |          | schnitt 177 step 17  |
| 24   |         | 4Step16  | STEP7 classic symb    | Bool      | %M41.7       |        |  |          |        |          | Schritt 16 / Step 16   |
| 25   |         | 4Step15  | STEP7 classic symb    | Bool      | %M41.6       |        |  |          |        |          | Schritt 15 / Step 15   |
| 26   | -671    | 4Step14  | STEP7 classic symb    | Bool      | 96M41.5      |        |  |          |        |          | Schritt 14 / Step 14   |
| 27   | -       | 154-912  | CTT DT alsos is sumh  | Deal      | N. 1. 1. 1.  |        |  |          | 8      |          | cohimata (constata   |
| 27   | -011    | 45tep15  | SIEP/ classic symb    | 8001      | 7610941.4    |        |  |          |        |          | Schritt 157 Step 15  |
| 28   | -       | 4Step12  | STEP7 classic symb    | Bool      | %M41.3       |        |  |          |        |          | Schritt 12 / Step 12   |
| 29   | -611    | 4Step11  | STEP7 classic symb    | Bool      | %M41.2       |        |  |          |        |          | Schritt 11 / Step 11   |
| 30   | -67     | Toggle   | STEP7 classic symb    | Bool      | %M45.0       |        |  |          |        |          | Umschalt Bit / Topple bit  |
| 31   |         | T Blielo   | CTED7 aleasis sumals  | T         | N TAA        |        |  |          | ä      |          | Blieb Times  |
| 51   | -011    | I_BIINK2   | SIEF/ classic symb    | limer     | 76144        |        |  | <b>•</b> |        |          | blink liner  |
| 32   |         | T_Blink1   | STEP7 classic symb    | Timer     | %T43         |        |  |          |        |          | Blink Timer  |
| 33   |         | S4   | STEP7 classic symb    | Bool      | %11.3        |        |  |          |        |          | Taster Richten / Reset button  |
| 34   | -671    | 53   | STEP7 classic symb    | Bool      | %11.2        |        |  |          | Ā      |          | Schalter Automatik-Manuell / Automatic-manual switch   |
| 20   | -       | 63   | CTT DT alsos is sumh  | Deal      | N12.4        |        |  |          | H      |          | Tester (öffere) / Stee hutter (seemelluslessed)  |
| 35   | -011    | 52   | SIEF/ classic symb    | 8001      | 7611.1       |        |  |          |        |          | laster stop (Offner) / stop button (normally closed)   |
| 36   |         | S1   | STEP7 classic symb    | Bool      | %11.0        |        |  |          |        |          | Taster Start / Start button  |
| 37   | -60     | Reset_OK   | STEP7 classic symb    | Bool      | %M44.2       |        |  |          |        |          | Richten erfolgreich abgeschlossen / Reset finished   |
| 38   | -67     | RC Stop  | STEP7 classic symb    | Bool      | %M132.4      |        |  |          | Ē      |          | Fernsteuerung Stop / remote control stop   |
| 20   |         | RC Stop  | CTER7 elessis sumb    | Beel      | NA122.0      |        |  |          | ä      |          | Ferretevening Step / terrete control step  |
| 29   |         | RC_Start   | SIEF/ classic symb    | 5001      | 761011 5 2.0 |        |  |          |        |          | Pernsteuerung start / remote control start   |
| 40   |         | RC_Reset   | STEP7 classic symb    | Bool      | %M132.1      |        |  |          |        |          | Fernsteuerung Richten / remote control reset   |
| 41   |         | 4Step06  | STEP7 classic symb    | Bool      | %M40.5       |        |  |          |        |          | Schritt 6 / Step 6   |
| 42   | -611    | 4Step05  | STEP7 classic symb    | Bool      | %M40.4       |        |  |          |        |          | Schritt 5 / Step 5   |
| 42   | -       | 4Step04  | CTEP7 classic symb    | Real      | 81140.2      |        |  |          | Ä      |          | Schritt 4 / Stop 4   |
| 40   | 100     | чыероч   | STEF7 Classic Symb    | 5001      | 70IVH0.5     |        |  |          |        |          | Schnitt 47 Step 4  |
| 44   |         | 4Step03  | STEP7 classic symb    | Bool      | %M40.2       |        |  |          |        |          | Schritt 3 / Step 3   |
| 45   | -611    | P_Edge   | STEP7 classic symb    | Bool      | %M44.6       |        |  |          |        |          | Flankenmerker / Edge flag  |
| 46   | -671    | P2   | STEP7 classic symb    | Bool      | %01.1        |        |  |          |        |          | Leuchtmelder Grundstellung (Reset) / Reset indicator light   |
| 47   | 400     | P1   | STEP7 classic curch   | Bool      | 9-01.0       |        |  |          | Ë      |          | Leuchtmelder Start / Start indicator light   |
| 41   |         |  | sherry classic symb   | 5501      |              |        |  |          |        |          | executive start start indicator ingfit   |
| 48   | -       | IP_N_FO  | SIEP7 classic symb    | Rool      | %Q0.7        |        |  |          |        |          | Station belegt / station occupied  |
| 49   | -       | IP_FI  | STEP7 classic symb    | Bool      | %10.7        |        | Image: A start and a start | <b></b>  |        |          | Folgestation frei / Downstream station free  |
| 50   | -00     | F Start  | STEP7 classic symb    | Bool      | %M44.0       |        |  |          |        |          | Start Merker / Start flag  |
| 51   | -       | E Mat  | CTER7 elsesis er      | Real      | 91 144 4 7   |        |  |          |        |          | Marketück ist nicht schunge / Markeinen is net black   |
| 51   | -011    | r_Mat  | SIEF7 classic symb    | 8001      | 761/04-4.7   |        |  |          |        |          | werkstuck ist nicht schwarz / workpiece is not black   |
| 52   |         | 1M1  | STEP7 classic symb    | Bool      | %Q0.0        |        |  |          |        |          | Handhabung zu Vorgängerstation / Handling to upstream station  |
| 53   | -00     | 183  | STEP7 classic symb    | Bool      | %10.3        |        |  |          |        |          | Handhabung bei Sortierposition / Handling at sorting position  |
| 54   | -671    | 182  | STEP7 classic symb    | Bool      | %10.2        |        |  |          | Ē      |          | Handhabung bei Folgestation / Handling at downstream station   |
|      | -       | 101  | CTER7 classic symbol  | Real      | 810.1        |        |  |          | ē      |          | Handhahung bei Vergängerstation / Handling at unstream station   |
| 35   |         |  | Sici / classic symb   | 2001      | /610.1       |        |  |          |        |          | nationabung bei vorgangerstation / nationing at upstream station   |
| 56   | -       | delay3   | STEP7 classic symb    | Timer     | %T42         |        |  |          |        |          | Merker Verzögerungszeit 3 abgelaufen / Flag delay time 3 expired   |
| 57   | -       | delay2   | STEP7 classic symb    | Timer     | %T41         |        |  |          |        |          | Merker Verzögerungszeit 2 abgelaufen / Flag delay time 2 expired   |
| 58   | -673    | delav1   | STEP7 classic symb    | Timer     | %T40         |        |  |          |        |          | Merker Verzögerungszeit 1 abgelaufen / Flag delay time 1 expired   |
| 50   | -       | VarE   | CTER7 elections       | P. de     | N MD AE      |        |  |          |        |          | Variable (variables  |
| 29   | -011    | varb   | Sign/ classic symb    | byte      | 76MB45       |        |  | <u> </u> |        |          | variable / variables   |
| 60   | -       | OBStat   | STEP7 classic symb    | Byte      | %QB0         |        | <b></b>  |          |        |          | Ausgangsbyte Station / outputbyte station  |
| 61   | -00     | OBPan  | STEP7 classic symb    | Byte      | %QB1         |        |  |          |        |          | Ausgangsbyte Bedienpult / outputbyte panel   |
| 62   | -671    | Init Pos   | STEP7 classic symb    | Bool      | %M44_1       |        |  |          |        |          | Station Handhaben in Grundstellung / Handling station in initial position  |
| 62   | -       | taia Dia   | CTED7 elevate symbol  | Deal      | N 144 4 5    |        |  |          |        |          | Initial initial and the first in the second |
| 03   | -       | IIII_BIL   | SIEF/ classic symb    | 6001      | %W44.5       |        |  |          |        |          | initialisterungspit / Initialisation bit   |
| 64   | -00     | RCVar  | STEP7 classic symb    | Byte      | %MB132       |        | Image: A state of the state | <b></b>  |        |          | Remote Variable / remote variables   |
| 65   |         | Part_AV  | STEP7 classic symb    | Bool      | %10.0        |        |  |          |        |          | Werkstück vorhanden / Workpiece available  |
| 66   | -571    | RC Em Stop   | STEP7 classic symb    | Bool      | %M132.5      |        |  |          |        |          |  |
| 00   | -       | add south  | sterr clossic symb    |           |              |        |  |          |        |          |  |
| 1000 |         | and the second state of th |                       |           |              |        | 1.00   | 1.00     | 1.00   |          |  |

# Farthest Right

Device 5 (Right most)

IP: 192.168.1.1 04HA-AS-1500



|        | PLC tag | s               |                    |           |             |   |        |          |          |        |          |  |
|--------|---------|-----------------|--------------------|-----------|-------------|---|--------|----------|----------|--------|----------|--|
|        | Na      | ime             | Tag table          | Data type | Address     | F | Retain | Acces    | Writa    | Visibl | Supervis | Comment  |
| 1      |         | Init_Bit        | STEP7 classic sy 💌 | Bool      | %M74.5      | - |        |          |          |        |          | Initialisierungsbit / Initialisation bit                                 |
| 2      | -00     | IP_N_FO         | STEP7 classic symb | Bool      | %Q0.7       |   |        |          |          |        |          | Station belegt / station occupied  |
| 3      | -00     | F_Start         | STEP7 classic symb | Bool      | %M74.0      |   |        |          |          |        |          | Start Merker / Start flag  |
| 4      | -00     | Em Stop         | STEP7 classic symb | Bool      | %11.5       |   |        |          |          |        |          | NOT-AUS entriegelt / Emergency stop unlocked                             |
| 5      | -00     | 7Step15         | STEP7 classic symb | Bool      | %M71.6      |   |        |          |          | Ē      |          | Schritt15/Step15   |
| -<br>6 | -01     | 7Step14         | STEP7 classic symb | Bool      | %M71.5      |   |        |          |          | Ä      |          | Schritt14/Step14   |
| 7      | -671    | 7Step13         | STEP7 classic symb | Bool      | %M71.4      |   |        |          |          | Ä      |          | Schritt13/Step13   |
| 2      | -       | 7Step12         | STEP7 classic symb | Bool      | 9610713     |   |        |          |          |        |          | Schritt12/Step12   |
|        | -       | Part 0/         | CTEP7 classic symb | Beel      | 8/10.0      |   |        |          |          |        |          | Wedetück verbanden / wederingen zweileble                                |
| ,      |         | 764-202         | STEP7 classic symb | Bool      | 7610.0      |   |        |          |          |        |          | Cabaitto ( Gran D  |
| 10     |         | /stepu2         | STEP7 classic symb | 8001      | 76IV1/ U. T |   |        |          |          |        |          | schnuz/stepz   |
| 11     | -001    | /Step01         | SIEP/ classic symb | Bool      | %M/0.0      |   |        |          |          |        |          | Schritt1/Step1   |
| 12     |         | 3M1             | STEP7 classic symb | Bool      | %Q0.3       |   |        |          |          |        |          | Stopper einfahren / Retract stopper                                      |
| 13     |         | 2M1             | STEP7 classic symb | Bool      | %Q0.2       |   |        |          |          |        |          | Weiche 2 ausfahren / Extend switch 2                                     |
| 14     | -00     | 7Step07         | STEP7 classic symb | Bool      | %M70.6      |   |        | <b>~</b> |          |        |          | Schritt7 / Step7   |
| 15     |         | 7Step06         | STEP7 classic symb | Bool      | %M70.5      |   |        | <b></b>  |          |        |          | Schritt6 / Step6   |
| 6      | -00     | 7Step05         | STEP7 classic symb | Bool      | %M70.4      |   |        |          |          |        |          | Schritt5 / Step5   |
| 17     | -00     | 7Step04         | STEP7 classic symb | Bool      | %M70.3      |   |        |          |          |        |          | Schritt4 / Step4   |
| 8      | -00     | delay1          | STEP7 classic symb | Timer     | %T70        |   |        |          |          |        |          | Verzögerungszeit 1 abgelaufen / delay time 1 expired                     |
| 9      | -00     | Var5            | STEP7 classic symb | Byte      | %MB75       |   |        |          |          |        |          | Variable / variables   |
| 0      | -       | Var4            | STEP7 classic symb | Byte      | %MB72       |   |        |          |          | Ē      |          | Variable / variables   |
| 1      | -671    | Var3            | STEP7 classic symb | Byte      | %MB71       |   |        |          |          | Ē      |          | Variable / variables   |
| 2      | -       | CycleEnd        | STEP7 classic symb | Bool      | %M74 3      |   |        |          |          |        |          | Zyklusende / cycle end   |
| 2      |         | eyeleentu<br>P4 | STEP7 classic symb | Rool      | %IV/ 4.5    |   |        |          |          |        |          | Putecha vall / Clida full  |
| . D    |         | 04              | STEP7 classic symb | Bool      | 7610.3      |   |        |          |          |        |          | Nuclear volt / State tall  |
| 24     |         | 83              | SIEP/ classic symb | 8001      | %10.2       |   |        |          |          |        |          | Werkstuck ist nicht schwarz / Workpiece not black                        |
| 25     |         | 82              | STEP7 classic symb | Bool      | %IO.1       |   |        |          |          |        |          | Werkstück aus Metall / Metallic workpiece                                |
| 26     |         | 181             | STEP7 classic symb | Bool      | %IO.4       |   |        |          |          |        |          | Weiche 1 eingefahren / Switch 1 retracted                                |
| 27     | -00     | 7Step18         | STEP7 classic symb | Bool      | %M72.1      |   |        | <b>~</b> |          |        |          | Schritt18 / Step18   |
| 8      |         | 7Step17         | STEP7 classic symb | Bool      | %M72.0      |   |        |          |          |        |          | Schritt17 / Step17   |
| 9      | -00     | 7Step16         | STEP7 classic symb | Bool      | %M71.7      |   |        | <b></b>  |          |        |          | Schritt16 / Step16   |
| 0      | -00     | Var2            | STEP7 classic symb | Byte      | %MB70       |   |        |          |          |        |          | Variable / variables   |
| 1      | -00     | Var1            | STEP7 classic symb | Byte      | %MB74       |   |        |          |          |        |          | Variable / variables   |
| 2      | -00     | Toggle          | STEP7 classic symb | Bool      | %M74.7      |   |        |          |          | Ē      |          | Umschalt Bit / Toggle bit  |
| 3      | -671    | T Blink2        | STEP7 classic symb | Timer     | %176        |   |        |          |          | Ä      |          | Blink Timer  |
| 24     | -       | T Blink1        | STEP7 classic symb | Timer     | %175        |   |        |          |          | H      |          | Blink Timer  |
| 25     |         | 54              | STEP7 classic symb | Real      | 9/11 2      |   |        |          |          |        |          | Tastes Bishten / Reset butten  |
|        | -       | 54              | STEP7 classic symb | Bool      | 2011.5      |   |        |          |          |        |          | Calada Antone Children and Antone Children and Antone Children           |
| 56     |         | 53              | STEP7 classic symb | BOOI      | %11.2       |   |        |          |          |        |          | Schalter Automatik-Manuell / Automatic-manual switch                     |
|        |         | 52              | STEP7 classic symb | Bool      | %11.1       |   |        |          |          |        |          | Taster Stop (Offner) / Stop button (normally closed)                     |
| 88     |         | 7Step19         | STEP7 classic symb | Bool      | %M72.2      |   |        |          |          |        |          | Schritt19/Step19   |
| 39     |         | S1              | STEP7 classic symb | Bool      | %11.0       |   |        |          |          |        |          | Taster Start / Start button  |
| 10     | -00     | Reset_OK        | STEP7 classic symb | Bool      | %M74.2      |   |        |          |          |        |          | Richten erfolgreich abgeschlossen / Reset finished                       |
| 11     | -00     | RC_Stop         | STEP7 classic symb | Bool      | %M132.4     |   |        | <b></b>  | <b></b>  |        |          | Fernsteuerung Stop / remote control stop                                 |
| 12     | -00     | 7Step11         | STEP7 classic symb | Bool      | %M71.2      |   |        |          |          |        |          | Schritt11/Step11   |
| 13     | -00     | 7Step10         | STEP7 classic symb | Bool      | %M71.1      |   |        |          |          |        |          | Schritt10/Step10   |
| 4      | -01     | 7Step09         | STEP7 classic symb | Bool      | %M71.0      |   |        |          |          |        |          | Schritt9 / Step9   |
| 15     | -61     | 7Step08         | STEP7 classic symb | Bool      | %M70.7      |   |        |          |          |        |          | Schritt8 / Step8   |
| 16     | -       | P Edge1         | STEP7 classic symb | Bool      | %M75.0      |   |        |          |          |        |          | Flankenmerker / Edge flag  |
| 7      |         | n_coger         | CTER7 classic symb | Baal      | 2011/ S.U   |   |        |          |          |        |          | Clashannania (Edge Reg   |
| 1      |         | OBCost          | STEP7 classic symb | Duta      | 761/1/5.1   |   |        |          |          |        |          | Aussesse has Catalian ( autouth to station                               |
| 0      |         | Obstat          | SIEP/ classic symb | byte      | %QB0        |   |        |          |          |        |          | Ausgangspyte station / outputbyte station                                |
| 9      | -01     | OBPan           | SIEP/ classic symb | Byte      | %QB1        |   |        |          |          |        |          | Ausgangsbyte Bedienpult / outputbyte panel                               |
| 0      | -00     | K1              | STEP7 classic symb | Bool      | %Q0.0       |   |        |          |          |        |          | Bandmotor ein / belt motor on  |
| 1      | -00     | Init_Pos        | STEP7 classic symb | Bool      | %M74.1      |   |        |          |          |        |          | Station Sortieren in Grundstellung / Sorting station in initial position |
| 2      | -00     | 2B2             | STEP7 classic symb | Bool      | %10.7       |   |        | <b></b>  | <b>~</b> |        |          | Weiche 2 ausgefahren / Switch 2 extended                                 |
| 3      | -00     | 2B1             | STEP7 classic symb | Bool      | %10.6       |   |        |          | <b></b>  |        |          | Weiche 2 eingefahren / Switch 2 retracted                                |
| 4      | -00     | 1M1             | STEP7 classic symb | Bool      | %Q0.1       |   |        | <b></b>  | <b></b>  |        |          | Weiche 1 ausfahren / Extend switch 1                                     |
| 5      | -00     | 182             | STEP7 classic symb | Bool      | %10.5       |   |        |          |          |        |          | Weiche 1 ausgefahren / Switch 1 extended                                 |
| 6      | -00     | delay4          | STEP7 classic symb | Timer     | %T74        |   |        |          |          | Ē      |          | Verzögerungszeit 4 abgelaufen / delay time 4 expired                     |
| 7      | -       | delay3          | STEP7 classic symb | Timer     | %772        |   |        |          |          | Ē      |          | Verzögerungszeit 3 abgelaufen / delav time 3 expired                     |
| 8      | -671    | delav2          | STEP7 classic symb | Timer     | %T71        |   |        |          |          |        |          | Verzögerungszeit 2 abgelaufen / delav time 2 expired                     |
| 9      | -       | 7Sten03         | STEP7 classic symb | Bool      | %M70.2      |   |        |          |          |        |          | Schritt3 / Sten3   |
| 0      |         | po po           | CTEP7 classic symb | Roal      | %01.2       |   |        |          |          |        |          | Lauchtmaldar Butraha vall / Slida 6-8 indiantar linta                    |
| 0      | -00     | F5              | SIEP/ classic symb | 8001      | %Q1.2       |   |        |          |          |        |          | Leuchtmeider kutsche Voll / Slide full Indicator light                   |
| 51     | -       | P2              | STEP7 classic symb | Bool      | %Q1.1       |   |        |          |          |        |          | Leuchtmelder Grundstellung (Reset) / Reset indicator light               |
| 52     | -00     | P1              | STEP7 classic symb | Bool      | %Q1.0       |   |        |          |          |        |          | Leuchtmelder Start / Start indicator light                               |
| 53     |         | RC_Start        | STEP7 classic symb | Bool      | %M132.0     |   |        | <b></b>  |          |        |          | Fernsteuerung Start / remote control start                               |
| 4      | -01     | RC_Reset        | STEP7 classic symb | Bool      | %M132.1     |   |        |          | <b></b>  |        |          | Fernsteuerung Richten / remote control reset                             |
| 5      | -00     | RC_Bits         | STEP7 classic symb | Word      | %MW132      |   |        | <b></b>  | <b></b>  |        |          | Fernsteuerungsbits / remote control bit                                  |
| 56     | -00     | RCVar           | STEP7 classic symb | Byte      | %MB132      |   |        |          |          | Ē      |          | Remote Variable / remote variables                                       |
| 57     | -00     | RC_Em_Stop      | STEP7 classic symb | Bool      | %M132.5     |   |        |          |          |        |          |  |
| 0      |         | and the second  |                    |           |             |   |        |          |          |        |          |  |

# Second Right

Device 4 (Second Right) IP: 192.168.1.1 09SO-AS-1500



### iie) (1)

## IP: 192.168.1.1 03BE-AS-1500

# Middle

| Device | 3 (M | liddle) |
|--------|------|---------|
|        |      | nuulei  |

| PLC t      | ags                      |                                |               |        |  |          |        |  |
|------------|--------------------------|--------------------------------|---------------|--------|--|----------|--------|--|
|            | Name                     | Tag table Data type            | Address       | Retain | Acces  | Writa    | Visibl | Supervis Comment   |
| -671       | R4                       | STEPZ classic sv Rool          | <b>1</b> %0.6 |        |  |          |        | Bohrlochprüfung in Ordnung / Checking drill hole o k                         |
|            | 83                       | STEP7 classic symb Bool        | 9410.5        |        |  |          |        | Bundschalttisch positioniert / Indeving table positioned                     |
|            | 82                       | STEP7 classic symbols boot     | 840.1         |        |  |          |        | Warkstück bei Rohmerichtung / Werkeinen et delling unte                      |
| -01        | 82                       | STEP7 classic symb Bool        | %10.1         |        |  |          |        | werkstuck bei Bonrvorrichtung / workpiece at drilling unit                   |
| -00        | 81                       | STEP7 classic symb Bool        | %10.2         |        |  |          |        | Werkstück bei Prüfvorrichtung / Workpiece at checking unit                   |
|            | 3Step30                  | STEP7 classic symb Bool        | %M33.5        |        |  |          |        | Schritt 30 / Step 30   |
| -          | 3Step27                  | STEP7 classic symb Bool        | %M33.2        |        |  | <b></b>  |        | Schritt 27 / Step 27   |
|            | 3Step26                  | STEP7 classic symb Bool        | %M33.1        |        |  |          |        | Schritt 26 / Step 26   |
| -01        | 3Step25                  | STEP7 classic symb Bool        | %M33.0        |        |  |          |        | Schritt 25 / Step 25   |
| -00        | 3Step24                  | STEP7 classic symb Bool        | %M32.7        |        |  |          |        | Schritt 24 / Step 24   |
|            | 3Step 23                 | STEP7 classic symb Bool        | %M32.6        |        |  |          | Ä      | Schritt 23 / Step 23   |
|            | 55 (cp25                 | STEP7 classic symb Bool        | × 00.1        |        |  |          |        | Bundeschaltisch Motor an / Indexing table motor on                           |
|            | K2                       | STEP7 classic symb Bool        | %Q0.1         |        |  |          |        | Rundschaltisch Motor an / Indexing table motor on                            |
| -00        | K1                       | STEP7 classic symb Bool        | %Q0.0         |        |  |          |        | Bohrmaschine Motor an / Drilling unit motor on                               |
|            | T_Blink1                 | STEP7 classic symb Timer       | %T38          |        |  |          |        | Blink Timer  |
| -00        | 54                       | STEP7 classic symb Bool        | %11.3         |        |  |          |        | Taster Richten / Reset button  |
| -671       | 53                       | STEPZ classic symb Bool        | %12           |        |  |          | Ä      | Schalter Automatik-Manuell / Automatic-manual switch                         |
|            | 36412                    | CTTD7 classic symbol Dool      | NA121 2       |        |  |          |        | Coloite 10 / Cons 10   |
| -10        | 5Step12                  | STEP7 classic symb Booi        | 76IVI01.0     |        |  |          |        | Schnu 127Step 12   |
|            | 3Step11                  | STEP7 classic symb Bool        | %M31.2        |        |  |          |        | Schrtt 11 / Step 11  |
|            | 3Step10                  | STEP7 classic symb Bool        | %M31.1        |        |  | <b></b>  |        | Schritt 10 / Step 10   |
| -00        | 3Step09                  | STEP7 classic symb Bool        | %M31.0        |        |  |          |        | Schritt 9 / Step 9   |
| -00        | 3Step08                  | STEP7 classic symb Bool        | %M30.7        |        |  |          |        | Schritt 8 / Step 8   |
| -          | 3Step17                  | STEP7 classic symb. Bool       | 96432.0       |        |  |          | Ä      | Schritt 17 / Step 17   |
|            | 2Step16                  | CTEP7 elessis synthemis boot   | W102.0        |        |  |          |        | Cabrie 16 / See 16   |
| -          | sstep i 6                | SIEF/ classic symb Bool        | %M31.7        |        |  | <b>M</b> |        | schritt 16/Step 16   |
| -          | 3Step15                  | STEP7 classic symb Bool        | %M31.6        |        |  |          |        | Schritt 15 / Step 15   |
| -01        | 3Step14                  | STEP7 classic symb Bool        | %M31.5        |        |  |          |        | Schritt 14 / Step 14   |
| -          | 3Step13                  | STEP7 classic symb Bool        | %M31.4        |        |  |          |        | Schritt 13 / Step 13   |
| -67        | delav8                   | STEP7 classic symb Timer       | %737          |        |  |          | Ä      | Verzögerungszeit 7 abgelaufen / delay time 7 expired                         |
| -          | delay7                   | STEP7 classic symbols Times    | 0,724         |        |  |          |        | Vertögerungszeit 7 abgelaufen / delautime 7 expired                          |
| -          | delay/                   | smooth inter                   | 70130         |        |  |          |        | verzogerungszent / abgeraulen / delay time / expired                         |
| -          | 3Step29                  | STEP7 classic symb Bool        | %M33.4        |        |  |          |        | Schritt 29 / Step 29   |
| -01        | P_Edge2                  | STEP7 classic symb Bool        | %M34.4        |        |  | <b></b>  |        | Flankenmerker / Edge flag  |
| -          | P_Edge1                  | STEP7 classic symb Bool        | %M35.0        |        |  |          |        | Flankenmerker / Edge flag  |
| -67        | P Edge                   | STEP7 classic symb Bool        | %M34.6        |        |  |          |        | Flankenmerker / Edge flag  |
| -          | 3Step02                  | STEP7 classic symbol Bool      | 9,1420.1      |        |  |          |        | Schritt 2 / Step 2   |
| -          | 55tep02                  | STEP/ Classic symp Bool        | %IVIDU.1      |        |  |          |        | sching 2 step 2  |
| -          | sstepul                  | SIEP/ classic symb Bool        | %M30.0        |        |  |          |        | Schritt I / Step 1   |
| -          | 182                      | STEP7 classic symb Bool        | %IO.4         |        |  |          |        | Bohrmaschine unten / Drilling unit in lower position                         |
| -00        | 181                      | STEP7 classic symb Bool        | %I0.3         |        |  |          |        | Bohrmaschine oben / Drilling unit in upper position                          |
| -00        | 3Step28                  | STEP7 classic symb Bool        | %M33.3        |        |  |          |        | Schritt 28 / Step 28   |
| -670       | delay6                   | STEP7 classic symb. Timer      | %735          |        |  |          |        | Verzögerungszeit 6 abgelaufen / delay time 6 expired                         |
| _          | delaye                   | CTER7 election symbols Times   | N TD 4        |        |  |          |        | Verzägendingszere ordagend den Ardena francisco expired                      |
| -00        | delays                   | STEP7 classic symb Timer       | %134          |        |  |          |        | verzogerungszeit 5 abgelaufen / delay time 5 expired                         |
|            | delay4                   | STEP7 classic symb Timer       | %T33          |        |  |          |        | Verzögerungszeit 4 abgelaufen / delay time 4 expired                         |
| -00        | delay3                   | STEP7 classic symb Timer       | %T32          |        |  |          |        | Verzögerungszeit 3abgelaufen / delay time 3 expired                          |
| -00        | delav2                   | STEP7 classic symb Timer       | %T31          |        |  |          |        | Verzögerungszeit 2 abgelaufen / delay time 2 expired                         |
| -          | delay1                   | STEP7 classic symb. Timer      | 96730         |        |  |          | Ä      | Verzögerungszeit 1 abgelaufen / delay time 1 evpired                         |
| -          | Ver 5                    | STEPT elessie symbolic finiter | ×100          |        |  |          |        | Verzegerüngszen rubgerüchtrichendy unter respired                            |
| -411       | Varb                     | STEP/ classic symb Byte        | %MB35         |        |  |          |        | Variable / variables   |
| -          | Var4                     | STEP7 classic symb Byte        | %MB32         |        | <b>_</b>   |          |        | Variable / variables   |
| -00        | Var3                     | STEP7 classic symb Byte        | %MB31         |        | Image: A start and a start |          |        | Variable / variables   |
| -00        | Var2                     | STEP7 classic symb Byte        | %MB30         |        |  |          |        | Variable / variables   |
| -          | Var1                     | STEP7 classic symb. Byte       | 96MB34        |        |  |          | Ä      | Variable (variable:  |
| -          |                          | STET / classic symb byte       | /6IVID.34     |        |  |          |        | variable / variables   |
| -411       | loggle                   | STEP/ classic symb Bool        | %M34.7        |        |  |          |        | Umschalt Bit / loggle bit  |
|            | T_Blink2                 | STEP7 classic symb Timer       | %T39          |        | <b>_</b>   |          |        | Blink Timer  |
| -11        | P3                       | STEP7 classic symb Bool        | %Q1.2         |        | <b></b>  |          |        | Leuchtmelder Werkstück schlecht / Workpiece not ok indicator light           |
| -          | P2                       | STEP7 classic symb Bool        | %Q1.1         |        |  |          |        | Leuchtmelder Grundstellung (Reset) / Reset indicator light                   |
| -57        | P1                       | STEP7 classic symb Bool        | %01.0         |        |  |          |        | Leuchtmelder Start / Start indicator light                                   |
|            | ORStat                   | STER7 classic symb. Bute       | %OR0          |        |  |          | Ä      | Aucoanochite Station / outputhite station                                    |
| - 21       | Obstat                   | STEP7 classic symb Byte        | %Q80          |        |  |          |        | Ausgangsbyte station / outputbyte station                                    |
| -          | OBPan                    | STEP7 classic symb Byte        | %QB1          |        |  |          |        | Ausgangsbyte Bedienpult / outputbyte panel                                   |
| -          | 3Step22                  | STEP7 classic symb Bool        | %M32.5        |        |  |          |        | Schritt 22 / Step 22   |
| -          | 3Step21                  | STEP7 classic symb Bool        | %M32.4        |        |  |          |        | Schritt 21 / Step 21   |
| <b>6</b> 0 | 3Step20                  | STEP7 classic symb Bool        | %M32.3        |        |  |          |        | Schritt 20 / Step 20   |
| -          | 25tep10                  | STEP7 classic symbols bool     | 9(H33.2       |        |  |          |        | Schritt 19 / Step 19   |
| -          | SSTEPTS                  | STEP/ classic symb Bool        | 76M32.2       |        |  |          |        | Schiller 19/Step 19  |
|            | 3Step18                  | STEP7 classic symb Bool        | %M32.1        |        |  |          |        | Schritt 18 / Step 18   |
| -          | S2                       | STEP7 classic symb Bool        | %11.1         |        |  |          |        | Taster Stop (Öffner) / Stop button (normally closed)                         |
| -00        | S1                       | STEP7 classic symb Bool        | %11.0         |        |  |          |        | Taster Start / Start button  |
| -670       | Reset OK                 | STEP7 classic symb Bool        | %M34.2        |        |  |          |        | Richten erfolgreich abgeschlossen / Reset finished                           |
|            | RC Stop                  | STEP7 classic symb Bool        | 96M122.4      |        |  |          |        | Fernsteuerung Stop / remote control stop                                     |
| -          | nc_stop                  | CTTPT classic symb BOOI        | /onvi152.4    |        |  |          |        | Comparing Stop Premote control stop  |
| -          | KC_Start                 | SIEP/ classic symb Bool        | %M132.0       |        |  |          |        | remsteuerung Start / remote control start                                    |
| -          | Em_Stop                  | STEP7 classic symb Bool        | %11.5         |        |  |          |        | NOT-AUS entriegelt / Emergency stop unlocked                                 |
| -          | CycleEnd                 | STEP7 classic symb Bool        | %M34.3        |        |  |          |        | Zyklus Ende / Cycle end  |
| -          | Bad_P_Pos3               | STEP7 classic symb Int         | %MM40         |        |  |          |        | Schlechtteil bei Übergabestelle / bad workpiece at interchange point         |
| -60        | Bad P Pos2               | STEP7 classic symb Int         | %MW38         |        |  |          |        | Schlechtteil bei Bohrmasch, / bad workpiece at drilling maschine             |
| -          | Rad P. Post              | STEP7 classic symbols int      | %L0AR6        |        |  |          |        | Schlechtteil bei Bohrlochnr. / bad workniese at checking drill bala          |
| 1          | Dou_1_ros1               | CTERT al                       | 2010/07/2/0   |        |  |          |        | Cabrie 7 Case 7  |
| -          | 3Stepu7                  | SIEP/ classic symb Bool        | %M30.6        |        |  |          |        | Schritt / / Step /   |
| -00        | 3Step06                  | STEP7 classic symb Bool        | %M30.5        |        |  |          |        | Schritt 6 / Step 6   |
| -          | 3Step05                  | STEP7 classic symb Bool        | %M30.4        |        |  |          |        | Schritt 5 / Step 5   |
| -          | 3Step04                  | STEP7 classic symb Bool        | %M30.3        |        |  |          |        | Schritt 4 / Step 4   |
| -          | 3Step03                  | STEP7 classic symbols Bool     | 961420.0      |        |  |          |        | Schritt 3 / Step 3   |
| -          | sstepus                  | STEP7 classic symb Bool        | %M50.2        |        |  |          |        | Sching Strate S  |
|            | KC_Reset                 | STEP7 classic symb Bool        | %M132.1       |        |  |          |        | Fernsteuerung Richten / remote control reset                                 |
| -          | RCVar                    | STEP7 classic symb Byte        | %MB132        |        |  |          |        | Remote Variable / remote variables   |
| -          | Part_AV                  | STEP7 classic symb Bool        | %10.0         |        |  |          |        | Werkstück vorhanden / Workpiece available                                    |
| 60         | Init Pos                 | STEP7 classic symb Bool        | %MB4_1        |        |  |          |        | Station Bearbeiten in Grundstellung / Processing station in initial position |
| -          | Init Bit                 | STEP7 classic symb             | 95MR4.5       |        |  |          |        | Initialisierungsbit / Initialisation bit                                     |
| -          | ID N SO                  | CTTDT classic symb Bool        | AW34.3        |        |  |          |        | Castien belook (at the second of   |
| -          | IP_N_FO                  | SIEP/ classic symb Bool        | %Q0.7         |        |  |          |        | Station beiegt / station occupied  |
|            | IP_FI                    | STEP7 classic symb Bool        | %10.7         |        |  | <b></b>  |        | Folgestation frei / Downstream station free                                  |
| -          | F_Start                  | STEP7 classic symb Bool        | %M34.0        |        |  | <b></b>  |        | Start Merker / Start flag  |
| -          | M6                       | STEP7 classic symb Bool        | %00.6         |        |  |          |        | Werkstück auswerfen / Push out workpiece                                     |
| -          | M5                       | STEP7 classic symbol Bool      | 800 E         |        |  |          |        | Werkstück prüfen / Proofing workninge  |
| -0         |                          | STET 7 Classic Symp Bool       | AQ0.5         |        |  |          |        | Werkstück profen / rooming workpiece   |
| -          | 1/14                     | SIEP/ classic symb Bool        | %Q0.4         |        |  |          |        | Werkstuck spannen / Hxing workpiece  |
| -          | K4                       | STEP7 classic symb Bool        | %Q0.3         |        |  |          |        | Bohrmaschine nach oben / Raise drilling unit                                 |
| -          | K3                       | STEP7 classic symb Bool        | %Q0.2         |        |  | <b></b>  |        | Bohrmaschine nach unten / Lower drilling unit                                |
| -          | RC_Em_Stop               | STEP7 classic symb Bool        | %M132.5       |        |  |          |        |  |
|            | <add new=""></add>       |                                |               |        |  |          |        |  |
|            | A DECEMBER OF THE REPORT |                                |               |        | -  | (T)      |        |  |



| •  | LC tag | 5              |                    |           |           |     |         |          |              | 1. A. A. A. | . ·      |   |
|----|--------|----------------|--------------------|-----------|-----------|-----|---------|----------|--------------|-------------|----------|---|
|    | Na     | me             | Tag table          | Data type | Address   | - " | etain / | Acces    | writa        | VISIDI      | Supervis | Comment   |
| 1  | -      | OBStat         | STEP7 classic sy   | Byte 🔳    | %QB0      |     |         |          |              |             |          | Ausgangsbyte Station / outputbyte station                             |
| 2  | -      | OBPan          | STEP7 classic symb | Byte      | %QB1      |     |         |          |              |             |          | Ausgangsbyte Bedienpult / outputbyte panel                            |
| 3  |        | Init_Pos       | STEP7 classic symb | Bool      | %M24.1    |     |         |          |              |             |          | Station Prüfen in Grundstellung / Testing station in initial position |
| 4  |        | Init_Bit       | STEP7 classic symb | Bool      | %M24.5    |     |         | <b>~</b> | $\checkmark$ |             |          | Initialisierungsbit / Initialisation bit                              |
| 5  |        | 3M1            | STEP7 classic symb | Bool      | %Q0.3     |     |         |          | <b></b>      |             |          | Luftkissenrutsche an / air slide on                                   |
| 6  | -63    | 2Step19        | STEP7 classic symb | Bool      | %M22.2    |     |         | <b></b>  | <b></b>      |             |          | Schritt 19 / Step 19  |
| 7  |        | 2Step18        | STEP7 classic symb | Bool      | %M22.1    |     |         | <b></b>  | <b></b>      |             |          | Schritt 18 / Step 18  |
| 8  | -63    | 2Step17        | STEP7 classic symb | Bool      | %M22.0    |     |         |          |              |             |          | Schritt 17 / Step 17  |
| 9  | -      | RC Stop        | STEP7 classic symb | Bool      | %M132.4   |     |         |          |              |             |          | Fernsteuerung Stop / remote control stop                              |
| 10 | -63    | RC Start       | STEP7 classic symb | Bool      | %M132.0   |     |         |          |              |             |          | Fernsteuerung Start / remote control start                            |
| 11 | -571   | RC Reset       | STEP7 classic symb | Bool      | %M132.1   |     |         |          |              |             |          | Fernsteuerung Richten / remote control reset                          |
| 12 | 40     | PC//ar         | STEP7 classic symb | Bute      | %MR132    |     |         |          |              |             |          | Pemote Variable / remote variables                                    |
| 12 | -      | 25tep05        | STER7 classic symb | Real      | %M20.4    |     |         |          |              | H           |          | Schritt 5 / Step 5  |
| 14 |        | 25tep05        | STEP7 classic symb | Real      | %M20.2    |     |         |          |              | H           |          | Schritt 4 / Stop 4  |
| 14 |        | 2Step04        | STEP7 classic symb | Bool      | %W20.5    |     |         |          |              |             |          | Schritt 4/ Step 4   |
| 15 | -00    | 2Step03        | STEP/ classic symb | BOOI      | %M20.2    |     |         |          |              |             |          | Schritt 3 / Step 3  |
| 16 | -      | 2Step02        | STEP7 classic symb | Bool      | %M20.1    |     |         |          |              |             |          | Schritt 2 / Step 2  |
| 17 |        | 2Step12        | STEP7 classic symb | Bool      | %M21.3    |     |         |          |              |             |          | Schritt 12 / Step 12  |
| 18 | -      | 2Step11        | STEP7 classic symb | Bool      | %M21.2    |     |         |          |              |             |          | Schritt 11 / Step 11  |
| 19 | -      | 2Step10        | STEP7 classic symb | Bool      | %M21.1    |     |         | <b></b>  | <b></b>      |             |          | Schritt 10 / Step 10  |
| 20 | -00    | 2Step09        | STEP7 classic symb | Bool      | %M21.0    |     |         |          |              |             |          | Schritt 9 / Step 9  |
| 21 |        | delay6         | STEP7 classic symb | Timer     | %T25      |     |         | <b></b>  | <b></b>      |             |          | Verzögerungszeit 6 abgelaufen / delay time 6 expired                  |
| 22 |        | delay5         | STEP7 classic symb | Timer     | %T24      |     |         |          |              |             |          | Verzögerungszeit 5 abgelaufen / delay time 5 expired                  |
| 23 | -00    | delay4         | STEP7 classic symb | Timer     | %T23      |     |         |          |              |             |          | Verzögerungszeit 4 abgelaufen / delay time 4 expired                  |
| 24 | -00    | delav3         | STEP7 classic symb | Timer     | %T22      |     |         |          |              | Ä           |          | Verzögerungszeit 3 abgelaufen / delay time 3 expired                  |
| 25 | -671   | IP N FO        | STEP7 classic symb | Bool      | %O0 7     |     |         |          |              | Ä           |          | Station belegt / station occupied                                     |
| 26 | -111   | IP FL          | STEP7 classic symb | Bool      | %0.7      |     |         |          |              | Ä           |          | Folgestation frei / Downstream station free                           |
| 27 | -      | E Start        | STER7 classic symb | Rool      | %M24.0    |     |         |          |              | ä           |          | Start Marker / Start flag   |
| 20 |        | T_Start        | CTED7 classic symb | Deal      | 2011.5    |     |         |          |              |             |          | Start Werker / Start hag  |
| 28 | -      | em_stop        | STEP7 classic symb | 8001      | 7611.5    |     |         |          |              |             |          | NO 1-AUS entriegent / Emergency stop unlocked                         |
| 29 | -      | IMI            | STEP/ classic symb | BOOI      | %Q0.0     |     |         |          |              |             |          | Hebezylinder hach unten / Lower lifting cylinder                      |
| 30 | -      | 182            | STEP7 classic symb | Bool      | %10.5     |     |         |          |              |             |          | Hebezylinder unten / Lifting cylinder lowered                         |
| 31 |        | 181            | STEP7 classic symb | Bool      | %10.4     |     |         |          |              |             |          | Hebezylinder oben / Lifting cylinder raised                           |
| 32 |        | B2             | STEP7 classic symb | Bool      | %IO.1     |     |         |          |              |             |          | Werkstück nicht schwarz / not black workpiece                         |
| 33 |        | delay2         | STEP7 classic symb | Timer     | %T21      |     |         | <b>~</b> | <b></b>      |             |          | Verzögerungszeit 2 abgelaufen / delay time 2 expired                  |
| 34 | -      | delay1         | STEP7 classic symb | Timer     | %T20      |     |         |          |              |             |          | Verzögerungszeit 1 abgelaufen / delay time 1 expired                  |
| 35 |        | Var5           | STEP7 classic symb | Byte      | %MB25     |     |         | <b></b>  | <b></b>      |             |          | Variable / variables  |
| 36 | -00    | Var4           | STEP7 classic symb | Byte      | %MB22     |     |         |          |              |             |          | Variable / variables  |
| 37 | -00    | Var3           | STEP7 classic symb | Byte      | %MB21     |     |         |          |              |             |          | Variable / variables  |
| 38 | -      | Var2           | STEP7 classic symb | Byte      | %MB20     |     |         |          |              | Ē           |          | Variable / variables  |
| 39 | -63    | Var1           | STEP7 classic symb | Byte      | %MB24     |     |         |          |              | Ä           |          | Variable / variables  |
| 40 | -611   | Toggle         | STEP7 classic symb | Bool      | %M24.7    |     |         |          |              | Ä           |          | Umschalt Bit / Toggle bit   |
| 41 | -67    | T Blink2       | STEP7 classic symb | Timer     | %T27      |     |         |          |              |             |          | Blink Timer   |
| 47 | -61    | T Blink1       | STEP7 classic symb | Timer     | %T28      |     |         |          |              | Ä           |          | Blink Timer   |
| 43 | -      | OccleEnd       | STEP7 classic symb | Bool      | %1424 3   |     |         |          |              |             |          | Zvklus Ende / Cusle and   |
| 40 | -      | CycleEnd<br>pc | CTEP7 classic symb | Bool      | %W24.5    |     |         |          |              |             |          | Zyklus Ender Cycle end  |
| 44 |        | 55             | STEL7 classic symb | Dool      | /010.5    |     |         |          |              |             |          | Cishasha is lishe share is / Cafet, lisht harris                      |
| 45 | -011   | 84             | SIEP/ classic symb | 8001      | %IU.2     |     |         |          |              |             |          | Sicherheitslichtschranke / Safetylight barrier                        |
| 46 |        | 54             | STEP7 classic symb | Bool      | %11.3     |     |         |          |              |             |          | Taster Richten / Reset button   |
| 47 | -01    | 2Step16        | STEP7 classic symb | Bool      | %M21.7    |     |         |          |              |             |          | Schritt 16 / Step 16  |
| 48 |        | 2Step15        | STEP7 classic symb | Bool      | %M21.6    |     |         |          |              |             |          | Schritt 15 / Step 15  |
| 49 | -00    | 2Step14        | STEP7 classic symb | Bool      | %M21.5    |     |         |          |              |             |          | Schritt 14 / Step 14  |
| 50 | -00    | 2Step13        | STEP7 classic symb | Bool      | %M21.4    |     |         |          | <b></b>      |             |          | Schritt 13 / Step 13  |
| 51 |        | Part_AV        | STEP7 classic symb | Bool      | %10.0     |     |         |          | <b>~</b>     |             |          | Werkstück vorhanden / Workpiece available                             |
| 52 | -01    | P3             | STEP7 classic symb | Bool      | %Q1.3     |     |         | <b></b>  | <b></b>      |             |          | Leuchtmelder Material / Indicator light material 1: 0=bk 1=rd 1=si    |
| 53 |        | P2             | STEP7 classic symb | Bool      | %Q1.1     |     |         |          | <b></b>      |             |          | Leuchtmelder Grundstellung (Reset) / Reset indicator light            |
| 54 | -00    | P1             | STEP7 classic symb | Bool      | %Q1.0     |     |         |          |              |             |          | Leuchtmelder Start / Start indicator light                            |
| 55 | -611   | 2Step01        | STEP7 classic symb | Bool      | %M20.0    |     |         |          |              | Ē           |          | Schritt 1 / Step 1  |
| 56 | -67    | 2M1            | STEP7 classic symb | Bool      | %00.2     |     |         |          |              |             |          | Auswerfzvlinder nach vom / Extend eiecting cylinder                   |
| 57 | -61    | 281            | STEP7 classic symb | Bool      | %0.6      |     |         |          |              | Ä           |          | Auswerfzwinder eingefahren / Fiecting swinder retracted               |
| 58 | -      | 1M2            | STEP7 classic symb | Bool      | %00.1     |     |         |          |              |             |          | Hebezylinder nach oben / Raise lifting cylinder                       |
| 50 |        | R Edge1        | CTEP7 classic symb | Rool      | WMDE C    |     |         |          |              |             |          | Flankenmerker / Edge flag   |
| 59 |        | i_cuget        | STEL7 Classic symb | 5001      | /erv125.0 |     |         |          |              |             |          | Markenmerker/Loge lag   |
| 60 |        | delay/         | SIEP/ classic symb | limer     | 76126     |     |         |          |              |             |          | verzogerungszeit / abgelauten / delay time / expired                  |
| 61 | -      | 25tep08        | SIEP7 classic symb | ROOL      | %M20.7    |     |         |          |              |             |          | Schritt 8 / Step 8  |
| 62 | -00    | 2Step07        | STEP7 classic symb | Bool      | %M20.6    |     |         |          |              |             |          | Schritt 7 / Step 7  |
| 63 | -      | 2Step06        | STEP7 classic symb | Bool      | %M20.5    |     |         |          |              |             |          | Schritt 6 / Step 6  |
| 64 |        | P_Edge         | STEP7 classic symb | Bool      | %M24.6    |     |         |          |              |             |          | Flankenmerker / Edge flag   |
| 65 | -      | \$3            | STEP7 classic symb | Bool      | %11.2     |     |         |          |              | <b></b>     |          | Schalter Automatik-Manuell / Automatic-manual switch                  |
| 66 | -      | \$2            | STEP7 classic symb | Bool      | %11.1     |     |         |          |              | <b></b>     |          | Taster Stop (Öffner) / Stop button (normally closed)                  |
| 67 | -01    | S1             | STEP7 classic symb | Bool      | %11.0     |     |         |          |              | <b></b>     |          | Taster Start / Start button   |
| 68 | -      | Reset_OK       | STEP7 classic symb | Bool      | %M24.2    |     |         |          |              |             |          | Richten erfolgreich abgeschlossen / Reset finished                    |
| 69 | -600   | RC Em Stop     | STEP7 classic symb | Bool      | %M132.5   |     |         |          |              |             |          | Remote Control Emergency Stop   |
|    |        |                |                    |           |           |     |         | _        | _            | _           |          |   |

# Second left

Device 2 (Second Left) IP: 192.168.1.1 02PR-AS-1500



| Р  | LC tag | s                  |                    |              |            |   |              |              |              |   |
|----|--------|--------------------|--------------------|--------------|------------|---|--------------|--------------|--------------|---|
|    | Na     | me                 | Tag table          | Data type    | Address    | Retain  | Acces        | Writa        | Visibl       | Supervis Comment  |
| 1  | -63    | 2M2                | STEP7 classic sy 💌 | Bool         | %Q0.2      | -   | <b></b>      |              |              | Abwurfimpuls ein / Ejection impulse on  |
| 2  | -      | 2M1                | STEP7 classic symb | Bool         | %Q0.1      |   | <b></b>      |              |              | Vakuum ein / Vacuum on  |
| 3  | -      | 2B1                | STEP7 classic symb | Bool         | %I0.3      |   |              |              |              | Werkstück angesaugt / Workpiece gripped                                       |
| 4  |        | 1Step03            | STEP7 classic symb | Bool         | %M10.2     | <ul> <li>Image: A start of the start of</li></ul> |              |              |              | Schritt 3 / Step 3  |
| 5  | -      | 1Step02            | STEP7 classic symb | Bool         | %M10.1     |   |              |              |              | Schritt 2 / Step 2  |
| 6  | -00    | 1Step01            | STEP7 classic symb | Bool         | %M10.0     |   |              |              | Ā            | Schritt 1 / Step 1  |
| 7  | -01    | P Edge1            | STEP7 classic symb | Bool         | %M15.0     |   |              |              |              | Flankenmerker / Edge flag   |
| 8  | -00    | P Edge             | STEP7 classic symb | Bool         | %M14.6     |   |              |              | Ä            | Flankenmerker / edgeflag  |
| 9  | -63    | 1Step12            | STEP7 classic symb | Bool         | %M11.3     |   |              |              | Ä            | Schritt 12 / Step 12  |
| 10 | -      | 1Step11            | STEP7 classic symb | Bool         | 96M11.2    |   |              |              | ä            | Schritt 11 / Step 11  |
| 11 |        | 15tep10            | CTER7 classic symb | Rool         | 968411.1   | •   |              |              |              | Schritt 10 / Step 10  |
| 12 |        | istepio            | STEP7 classic symb | Bool         | %IO 7      | •   |              |              |              | Educatation froi / Downstream station fron                                    |
| 12 | -      | 17_F1              | STEP7 Classic symb | 8001         | 7610.7     |   |              |              |              | rogestation ner / bowns deam station nee                                      |
| 13 | -      | F_Start            | SIEP/ classic symb | 8001         | %M14.0     |   |              |              |              | Start Merker / Start hag  |
| 14 | -      | Em_Stop            | SIEP/ classic symb | Bool         | %11.5      |   |              |              |              | NOI-AUS entriegelt / Emergency stop unlocked                                  |
| 15 | -      | Init_Pos           | STEP7 classic symb | Bool         | %M14.1     |   |              |              |              | Station Verteilen in Grundstellung / Distributing station in initial position |
| 16 | -      | Init_Bit           | STEP7 classic symb | Bool         | %M14.5     |   |              |              |              | Initialisierungsbit / Initialisation bit                                      |
| 17 | -      | Var4               | STEP7 classic symb | Byte         | %MB15      |   |              |              |              | Variable / variables  |
| 18 | -      | 1Step16            | STEP7 classic symb | Bool         | %M11.7     | Image: A start and a start and a start a st         | <b>~</b>     |              |              | Schritt 16 / Step 16  |
| 19 | -      | 1Step15            | STEP7 classic symb | Bool         | %M11.6     | <b>V</b>  | <b></b>      |              |              | Schritt 15 / Step 15  |
| 20 | -      | 1Step14            | STEP7 classic symb | Bool         | %M11.5     |   | <b></b>      |              |              | Schritt 14 / Step 14  |
| 21 | -      | 1Step06            | STEP7 classic symb | Bool         | %M10.5     | Image: A start and a start          |              |              |              | Schritt 6 / Step 6  |
| 22 | -00    | 1Step05            | STEP7 classic symb | Bool         | %M10.4     |   |              |              |              | Schritt 5 / Step 5  |
| 23 | -      | 1Step04            | STEP7 classic symb | Bool         | %M10.3     |   |              |              |              | Schritt 4 / Step 4  |
| 24 | -63    | Var3               | STEP7 classic symb | Byte         | %MB11      |   |              |              | Ā            | Variable / variables  |
| 25 | -61    | Var2               | STEP7 classic symb | Byte         | %MB10      |   |              |              |              | Variable / variables  |
| 26 | -00    | Var1               | STEP7 classic symb | Byte         | %MR14      |   |              |              | Ä            | Variable / variables  |
| 27 |        | Toggle             | CTER7 classic symb | Rool         | 948.41.4 7 |   |              |              | ä            | Imachalt Bit / Toggle bit   |
| 20 |        | T Blink2           | CTEP7 classic symb | Timer        | 0/ 71 1    | •   |              |              |              | Plink Timer   |
| 20 |        | T Dialid           | CTED7 classic symb | Timer        | WT10       |   |              |              |              | Diale Trace   |
| 29 |        |                    | STELV classic symb | Deal         | 20110      |   |              |              |              | Trate Dicker / Drate butter   |
| 30 | -      | 54                 | STEP7 classic symb | BOOI         | %11.3      |   |              |              |              | laster kichten / keset button   |
| 31 | -      | 53                 | SIEP/ classic symb | 8001         | %11.2      |   |              |              |              | Schalter Automatik-Manuell / Automatic-manual switch                          |
| 32 | -      | 52                 | SIEP/ classic symb | Bool         | %11.1      |   |              |              |              | laster Stop (Offner) / Stop button (normally closed)                          |
| 33 | -      | S1                 | STEP7 classic symb | Bool         | %11.0      |   |              |              |              | Taster Start / Start button   |
| 34 |        | Reset_OK           | STEP7 classic symb | Bool         | %M14.2     |   |              |              |              | Richten erfolgreich abgeschlossen / Reset finished                            |
| 35 | -      | RC_Stop            | STEP7 classic symb | Bool         | %M132.4    |   |              |              |              | Fernsteuerung Stop / remote control stop                                      |
| 36 | -      | RC_Start           | STEP7 classic symb | Bool         | %M132.0    |   |              |              |              | Fernsteuerung Start / remote control start                                    |
| 37 | -      | RC_Reset           | STEP7 classic symb | Bool         | %M132.1    |   |              | <b></b>      |              | Fernsteuerung Richten / remote control reset                                  |
| 38 | -      | 1Step13            | STEP7 classic symb | Bool         | %M11.4     | $\checkmark$  | <b>~</b>     | <b></b>      |              | Schritt 13 / Step 13  |
| 39 | -      | RCVar              | STEP7 classic symb | Byte         | %MB132     |   | <b></b>      |              |              | Remote Variable / remote variables  |
| 40 | -      | 1M1                | STEP7 classic symb | Bool         | %Q0.0      |   | <b></b>      |              |              | Auschiebzyl. Werkstück ausschieben/ Ejecting cylinder push out workpi.        |
| 41 | -00    | 182                | STEP7 classic symb | Bool         | %IO.1      |   |              |              |              | Auschiebzyl. ausgefahren / Ejecting cylinder extended                         |
| 42 | -00    | 1B1                | STEP7 classic symb | Bool         | %10.2      |   | <b>~</b>     |              |              | Auschiebzyl. eingefahren / Ejecting cylinder retracted                        |
| 43 | -00    | P3                 | STEP7 classic symb | Bool         | %Q1.2      |   | <b></b>      | <b></b>      |              | Leuchtmelder Magazin leer / Magazine empty indicator light                    |
| 44 | -00    | P2                 | STEP7 classic symb | Bool         | %Q1.1      |   | <b></b>      | <b></b>      |              | Leuchtmelder Grundstellung (Reset) / Reset indicator light                    |
| 45 | -00    | 3M1                | STEP7 classic symb | Bool         | %Q0.3      |   |              |              |              | Schwenkzyl. zu Magazin / Swivel drive to magazine                             |
| 46 | -00    | 382                | STEP7 classic symb | Bool         | %10.5      |   | <b></b>      |              |              | Schwenkzyl. in Pos. Folgestation / Swivel drive in pos. downstream stat.      |
| 47 | -00    | 381                | STEP7 classic symb | Bool         | %10.4      |   | <b></b>      | <b>~</b>     |              | Schwenkzyl. in Pos. Magazin / Swivel drive in pos. magazine                   |
| 48 | -00    | 1Step09            | STEP7 classic symb | Bool         | %M11.0     |   |              |              |              | Schritt 9 / Step 9  |
| 49 | -00    | 1Step08            | STEP7 classic symb | Bool         | %M10.7     |   |              |              | Ā            | Schritt 8 / Step 8  |
| 50 | -01    | 1Step07            | STEP7 classic symb | Bool         | %M10.6     |   |              |              | Ē            | Schritt 7 / Step 7  |
| 51 | -671   | P1                 | STEP7 classic symb | Bool         | %01.0      |   |              |              | Ä            | Leuchtmelder Start / Start indicator light                                    |
| 52 | -611   | OBStat             | STEP7 classic symb | Byte         | %080       |   |              |              | Ä            | Ausgangsbyte Station / outputbyte station                                     |
| 53 | -      | OBPan              | STEP7 classic symb | Byte         | %OB1       |   |              |              |              | Ausgangsbyte Bedienpult / outputbyte panel                                    |
| 54 |        | OrdeEnd            | STEP7 classic symb | Bool         | 96.414.3   |   |              |              |              | Zyklucanda / OrclaEnd   |
| 54 |        | eyeleenu<br>P4     | STEP7 classic symb | Real         | 8/10 6     | •   |              |              |              | Senser Magazin Jear / Senser magazine empty                                   |
| 50 |        | 21/2               | STER7 classic symb | Bool         | ×00.4      |   |              |              |              | Sensor wagazin leer / sensor magazine empty                                   |
| 50 |        | DC Car Char        | STEP/ classic symb | Buoi         | %QU.4      |   |              |              |              | Schwenkzyl, zu Polgestation / Swivel drive to downstream station              |
| 57 |        | RC_Em_Stop         | SIEP/ classic symb | BUOI<br>Deal | 76M132.5   |   |              |              |              | Remote Control Emergency Stop   |
| 58 |        | Ext_Em_Stop        | SIEP/ classic symb | 8001         | 7611.6     |   |              |              |              | External Emergency Stop   |
| 59 |        | Em_Stop_Act        | SIEP7 classic symb | 8001         | %M133.0    |   |              |              |              | Emergency Stop Activated  |
| 60 |        | <add new=""></add> |                    |              |            |   | $\checkmark$ | $\checkmark$ | $\checkmark$ |   |

# Farthest Left

Device 1 (Left most) IP: 192.168.1.1 01VE-AS-1500

This station is a stand-alone assembly block with a number of hopper feeders ready to present various parts to the robot for assembly. The parts may vary somewhat but typically are fed to the robot which performs an assembly before feeding the part into the five station manufacturing system.



To write the control program for one of these sections, first develop an accurate I/O list. Turn on and off each of the digital outputs and observe what happens. Does something move? Does something change? List the inputs that change for each of the outputs.

Then write a sequential program using preferably LAD to control this section of the line. Do not consider linkage with other sections. Just control the section of the line under control of the PLC you are programming. Create a start mechanism to introduce a part and move it through your section. Demo the completed program for credit.

The following is an example of Sequential Function Chart, an alternative to LAD. You may choose to use it instead of LAD. See extra credit for using SFC.





Turn on and off all outputs. Observe the function and write it in the attached table. Also include the Signal Assignment (turns on/turns off with coil on).

**Output Definition Table** 

| Actuator | Function/State | Signal Assignment |
|----------|----------------|-------------------|
|          |                |                   |
|          |                |                   |
|          |                |                   |
|          |                |                   |
|          |                |                   |

Then, observe the input(s) that are changed when the output is turned on/off. This table is developed next.

# Input Definition Table

| Sensor | Function/State | Signal Assignment |
|--------|----------------|-------------------|
|        |                |                   |
|        |                |                   |
|        |                |                   |
|        |                |                   |

Now, write the program to introduce a part and move through the various stations of your section. Consider your choice of language:

Ladder FBD SFC

Each has advantages. The examples of Ch. 11 give starter ideas for Ladder. FBD can be used in similar fashion. SFC is new and should be considered.

You may want to try all three and compare your results.



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