

Quick Start Motion Application Software – QS_DIG_1

Quick Start Motion Application Software allows commissioning of 1 to 32 axes motion applications in a matter of hours. Basic motion control is transformed from a programming effort to an application exercise.

The foundation of the Quick Start package is the basic motion control application specific function block (ASFB). Two ASFB's address basic motion control, these are:

- QS_AIS_1 – Basic servo motion control ASFB
- QS_DIG_1 – Master axis feedback interface ASFB

One ASFB provides fault control and fault history, this is:

- QS_FLT_1 – Fault control and fault history ASFB

One ASFB provides integration with a Cimrex Operator Interface, this is:

- QS_C69_1 – Integration with Cimrex C69 HMI operating in portrait mode

These functions may be used with PiC, MMC or MMC for PC controls.

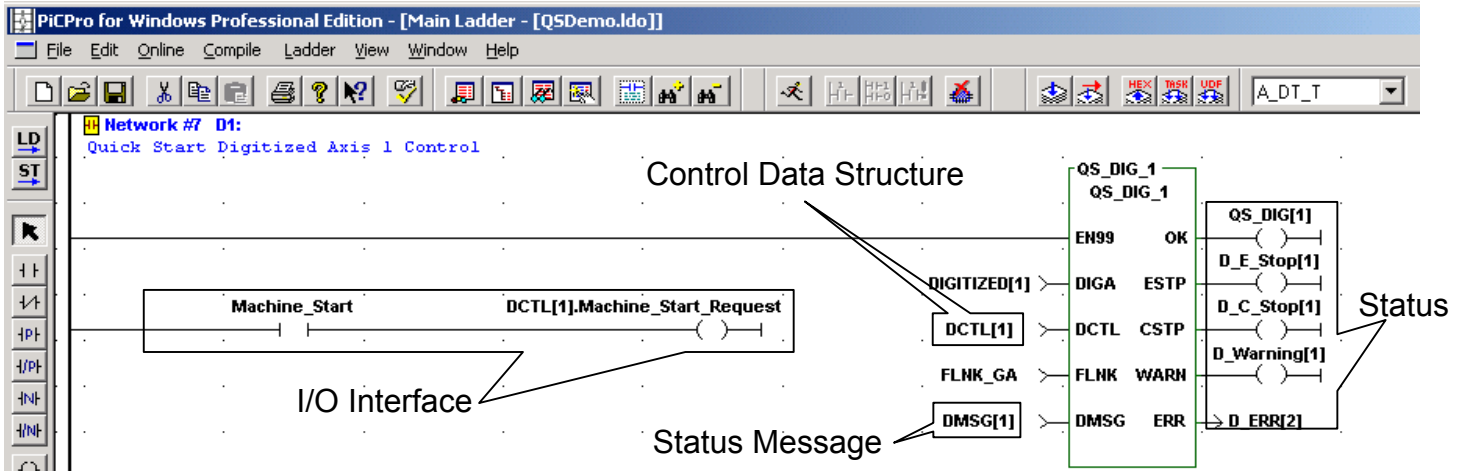
This document covers the functionality provided by QS_DIG_1.

QS_DIG_1 Overview

QS_DIG_1 provides a single-network solution to interfacing to a digitizing axis providing status and fault control. Functions provide by QS_DIG_1 include:

Status, including:

- Digitizing axis position
- Digitizing axis fault detection and status reporting



Using QS_DIG_1 each digitized axis is controlled by a single network in the main application program. Interface between your application and QS_DIG_1 using the DCTL Control Data Structure. The Status Message output, DMSG, provides text status messages for the digitized axis. The Status outputs of QS_DIG_1 provide an overview of digitized axis fault status. The I/O Interface logic provides the interface used for clearing faults.

Control using the digitized axis can be performed by additional application logic.

The Status Data Structures includes:

Structure	Description	Function
DCTL	Status	Present Status and Control Information
FLNK	Fault Link	Coordinate fault control in multiple axis applications

The Status Message provides:

Variable	Description	Function
DMSG	Status	Description of operating status or fault if fault present

DIGA – Digitizing Axis Number

DIGA specifies the digitized axis number, from 1 to 32, for this instance of QS_DIG_1. DIGA is converted to the servo setup digitized axis number, 49 to 80, by QS_DIG_1. If DIGA is out of range ERR, programming error, will be 1003.

DCTL Digitized Control and Status Structure

Use the DCTL to clear faults and access status information describing the operation of this digitized axis.

Name	Type	Description
DCTL	Struct	Digitized Axis Control and Status Data Structure
.Machine_Start_Request	BOOL	I – Set to clear fault
.Axis_Description	STRING[22]	I – Application specific description of this axis
.Initialization_Okay	BOOL	O - On when Axis Initialized
.Fault	BOOL	O - On when fault present
.Fault_Description	STRING[32]	O - Description of fault present on this axis
.E_Stop_Fault	BOOL	O - On when fault is E Stop fault
.C_Stop_Fault	BOOL	O - On when fault is C Stop fault
.Warning	BOOL	O - On when a warning condition is present
.Actual_Position	DINT	O - Position that axis is actually in
.FMSGn	INT	O – HMI status message number
.Status_Fast_Input_Occurred	BOOL	O - On when the fast input has been detected
.Status_Fast_Input_On	BOOL	O - On when the fast input is in the on state
.Status_Good_Mark_Detected	BOOL	O - On when REGIST has detected a good mark
.Status_Bad_Mark_Detected	BOOL	O - On when REGIST has detected a bad mark
.Status_Fast_Input_Rising	BOOL	O - Indicates direction of last fast input transition
.Structure_Check_Constant	DINT	I – Verify structure is correct size – set to 918273
END_STRUCT		

DCTL.Machine_Start_Request – Input

- One-shot to clear faults.

DCTL.Axis_Description – Input

- Name of this axis. Appended to fault description to identify which axis caused the fault.

DCTL.Initialization_Okay – Output

- ON when axis is present in the system and has initialized properly
 - OFF if this axis number was not included in the application specific servo setup function or if the STRTSERV, servo system start up, function was not called or failed due to an error. See Initializing the Servo System for detailed information.

DCTL.Fault – Output

- ON when an E_Stop fault, C_Stop fault or Warning condition is present See the FMSG status message for a text description of all possible fault conditions.
 - OFF when no faults are present

DCTL.Fault_Description – Output

- Text message describing fault. See FMSG messages for descriptions

DCTL.E_Stop_Fault – Output

- ON when an Emergency Stop fault is present

DCTL.C_Stop_Fault – Output

- ON when a Controlled Stop Fault is present

DCTL.Warning – Output

- ON when a Warning condition is present

DCTL.Actual_Position – Output - Indicates the present position.
DCTL.FMSGn – Output - Indicates the message number for HMI status message display. See the FMSG table later in this document for a list of all Status messages.
DCTL.Status_Fast_Input_Occurred – Output - Indicates that the Fast Input is in the ON state. See STATUSSV function for more information
DCTL.Status_Fast_Input_On – Output - Indicates that the Fast Input is in the ON state. See STATUSSV function for more information.
DCTL.Status_Good_Mark_Detected – Output - Indicates that REGIST has detected a valid registration mark. See STATUSSV and REGIST functions for more information
DCTL.Status_Bad_Mark_Detected – Output - Indicates that REGIST has detected an invalid registration mark. See STATUSSV and REGIST functions for more information
DCTL.Status_Fast_Input_Rising – Output - Indicates the direction of the last fast input transition. See STATUSSV function for more information. See STATUSSV and REGIST functions for more information
DCTL.Structure_Check_Constant - Input - Must be set to an initial value of 12345. Checked by QS_DIG_1 on first scan, if not 918273 then ERR will be set to 1001, ESTP will be energized, and QS_DIG_1 will exit without executing.

FAULT LINK Data Structure

The Fault Link Data Structure is used in multi-axis applications to automatically link the fault status of a group of axes together. No user programming of any variables in the FLNK structure is required. Simply place the same structure, e.g. FLNK_GA, at the input to every axis' QS_DIG_1 ASFB and also into the FLNK input of the QS_FLT_1, fault manager ASFB.

When linked, if any axis in the group enters a C_Stop condition then all axes in the group will be placed in a C_Stop condition. Likewise, if any axis in the group enters an E_Stop condition then all axes in the group will be placed in an E_Stop condition. QS_FLT_1, the fault manager, will time stamp and log the first fault that occurred so it can be reported and corrected.

Multiple groups of axes can be programmed with independent fault control by using a separate fault link data structure. For example, create a new fault link structure, FLNK_GB, and use a separate instance of the fault control manager, QS_FLT_1. See the documentation for QS_FLT_1 for more information.

Name	Type	Description
FLNK	Struct	Coordinate fault control in multiple axis applications
.Axis	USINT	I/O – Axis number of first axis to fault
.E_Stop	BOOL	I/O – E Stop Fault present
.C_Stop	BOOL	I/O – C Stop Fault present
.Warning	BOOL	I/O – Warning condition present
.AMSG	STRING[22]	O – fault axis for first fault
.FMSG	STRING[32]	O – fault message for first fault
.FMSGn	INT	O – fault message number for first fault
.Structure_Check_Constant	DINT	I – Verify structure is correct size - set to 67891
END_STRUCT		

FLNK.variables

- Used by QS_AIS_1, QS_DIG_1 and QS_FLT_1 to coordinate faults. Must not be used by the application.

FLNK.Structure_Check_Constant – Input

- Must be set to an initial value of 67891. Checked by QS_DIG_1 on first scan, if not 67891 then ERR will be set to 1002, ESTP will be energized, and QS_DIG_1 will exit without executing.

QS_DIG_1 Status Message Output

QS_DIG_1 provides an English-language status message output, DMSG, to provide an indication of the state of the digitized axis system at a glance. The English-language text can be viewed using PiCPro's animation and view list. The same messages are presented on the Cimrex C69 but are drawn from the Cimrex message library. The Cimrex C69 can be configured with multiple libraries to support languages other than English. The status messages are:

Variable	Description	Function
DMSG	Status	Description of operating status or fault if fault present

<i>DMSG during Normal Operation</i>		
No Fault	Normal Operation	DCTL.DMSGn = 354
Indicates that DCTL.Machine_Start_Request has been one-shot or is being energized starting the Machine Start Sequence. See Machine Start Sequence in QS_AIS_1 for more information.		
<i>DMSG when E Stop Fault is present</i>		
First Scan E Stop	E Stop Fault	DCTL.DMSGn = 360
Indicates that the control scan has been stopped and restarted (typically after a power cycle)		
Axis Not Initialized	E Stop Fault	DCTL.DMSGn = 361
Indicates an application programming error causing an E Stop Fault. Caused by this axis not being included in the servo setup function or an error occurring during servo system initialization. See Initializing the Servo System in QS_AIS_1 for detailed information.		
Programming Error	E Stop Fault	DCTL.DMSGn = 362
Indicates an application programming error. The last variable in each of the Data Structures input to QS_AIF_1 has a constant which is checked. If it is incorrect QS_DIG_1 cannot function and this error will be reported. The ERR output will indicate which structure is incorrect.		
Loss of Feedback	E Stop Fault	DCTL.DMSGn = 365
Indicates that the control system detected a loss of the feedback signal for this axis causing an E Stop Fault.		

Troubleshooting QS_DIG_1

In case of difficulties use PiCPro's animation and view capability to observe the operation of QS_DIG_1.

If the OK output of QS_DIG_1 is OFF there is a programming error. Check for:

Problem	Digitized axis faults won't clear
QS_DIG_1 Output Conditions	OK = OFF ERR <> 0 SMSG = <i>Programming Error</i>
<p>1 - Check ERR: ERR = 1001 – DCTL structure size incorrect ERR = 1002 – FLNK structure size incorrect If an incorrect structure size error occurred make sure that the correct structure is programmed as the input to QS_DIG_1, that the structures array index is not greater than its array size in software declarations and that a revision changing the number of members in the structure has not occurred. ERR = 1003 – Axis number out of range QS_DIG_1 supports axis numbers 1 to 32 and translates them to the servo software digitized axis numbers 49 to 80.</p>	
Problem	Digitized axis faults won't clear
QS_DIG_1 Output Conditions	OK = OFF ERR = 0 SMSG = <i>Axis Not Initialized</i>
<p>The servo axis specified by the QS_DIG_1 Axis input was not included in the servo setup function or an error occurred when the servo setup function was called. 1 - Check the servo setup function network to see if an error was reported. 2 - Open the servo setup function and make sure the axis is defined. 3 - Check the QS_DIG_1 axis input and make sure the axis number is correct.</p>	

If the OK output of QS_DIG_1 is ON but an E Stop fault occurs. Check for:

Problem	An E Stop condition is detected
QS_DIG_1 Output Conditions	OK = ON ERR = 0 SMSG = <i>First Scan E Stop</i>
<p>This is the normal state of SMSG after control power on or restart of the scan. SMSG never indicates <i>First Scan E Stop</i> after the first time DCTL.Machine_Start_Request is ON. 1 - To clear faults and start the close loop sequence DCTL.Machine_Start_Request must make a transition from OFF to ON. Check to make sure that it is not on all of the time. 2 - Check to make sure DCTL.Machine_Start goes on when the control input used to actuate it goes ON. 3 - Check the C69 fault history for First Scan E Stop faults - each one indicates that the control power has been powered on or the control scan has been stopped and restarted.</p>	

Problem	An E Stop condition is detected
QS_DIG_1 Output Conditions	OK = ON ERR = 0 ESTP = ON SMSG = <i>Loss of Feedback</i>
<p>1 - Check the connection between the feedback device and the control</p> <p>2 - Check the power supply to the feedback device</p> <p>3 - Check cable of the interface cable to make sure it is not near motor power cables or other electrical noise sources.</p>	