

SIEMENS

SIMATIC

Process Control System PCS 7 BATCH-Interfaces Blocks

Reference Manual

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Safety Guidelines

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring to property damage only have no safety alert symbol. The notices shown below are graded according to the degree of danger.



Danger

indicates that death or severe personal injury **will** result if proper precautions are not taken.



Warning

indicates that death or severe personal injury **may** result if proper precautions are not taken.



Caution

with a safety alert symbol indicates that minor personal injury can result if proper precautions are not taken.

Caution

without a safety alert symbol indicates that property damage can result if proper precautions are not taken.

Notice

indicates that an unintended result or situation can occur if the corresponding notice is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by **qualified personnel**. Within the context of the safety notices in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

Prescribed Usage

Note the following:



Warning

This device and its components may only be used for the applications described in the catalog or the technical description, and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens.
Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance.

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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1 Overview of the Block Description

Introduction

The block descriptions always organized in the following form:

- Overview of the block description
- Object name (type + number)
- Function
- How the block functions
- Calling OBs
- Error handling
- I/Os of ...
- Operating control and monitoring of ...

Overview of the block description

Example: IEPH: Equipment Phase - BATCH Interface

The title begins with the type name of the block (IEPH). This symbol name is entered in the symbol table and must be unique in the project.

You will find the keyword for the task/function of the block (equipment phase BATCH interface) in the type name.

Object Name (Type + Number)

FBx

The object name of the block type is formed by the type of implementation

Function block = FB, function = FC and the block number = x.

Function

This section briefly explains the function of the block. You can find additional information about complex blocks in the section "How the Block Functions".

How the Block Functions

Here you can find additional information about the functions of individual inputs, modes, time sequences, etc. You can learn about the overall relationships in order to use the block effectively, here.

Calling OBs

This section contains information about the organization blocks (OBs) in which the block being described must be installed. When using CFC, the block is installed in the cyclic OBs (cyclic interrupt) and automatically in the OBs listed in the taskbar of the block (for example, in OB100 for a hot restart).

During compilation, CFC generates the required OBs. When using the blocks without CFC, you must program these OBs and call the block instance in them.

Error Handling

You can find the error code in the CFC chart at the **ENO** Boolean block output. The value corresponds to the **BR** (binary result in STEP 7 SCL on completion of the block) or the **OK** bit (in SCL notation) has the following meaning:

- ENO=BR=OK=1 (TRUE) ->The result of the block is correct.
- ENO=BR=OK=0 (FALSE) -> The result or the conditions for calculating the result (for example, input values, modes) are not valid.

With FBs, you will also find the inverted BR at the output **QERR** of the instance DB.

- QERR=NOT ENO

The error code is produced in two independent ways:

The operating system detects a processing error (for example, value overflow, called system functions supply error ID with BR=0). This is a system function and is not described in detail in the individual block descriptions.

The block algorithm checks whether values and modes are functionally permitted. These errors are documented in the description of the block.

You can evaluate the error code, for example, to create messages or to work with substitute values instead of incorrect results.

I/Os of ...

The I/Os represent the data interface of the block. Via these I/Os, you can transfer data to the block and fetch results from it.

I/O (Parameter)	Meaning	Type	Default	I/O	Attr.	OCM	Permitted Values
SP_VAL	Setpoint (input)	DInt	0	I		+	

The "I/Os" table lists all the input and output parameters of the block type that the user can access with configuration tools. They are sorted alphabetically. I/Os that can only be accessed by the algorithm of the block, so-called internal variables, are not listed. The columns have the following meaning:

- **I/O**
Name of the parameter derived from the English name.
Example: PV_IN = **P**rocess **V**ariable **I**Nput (process variable, control variable).
As far as permitted by SIMATIC conventions, the same names were used.
- **Meaning**
Function (sometimes abbreviation)
- **Type**
S7 data type of the parameter (such as BOOL, REAL)
- **Default**
The value of the parameter before the block is run for the first time, unless this was changed during configuration
- **I/O**
Type of access used by the block algorithm on the parameter; differentiates inputs, reacting inputs and outputs (see table below)

Abbr.	I/O
I	Input Value supply of the block (representation in the CFC: left side of block)
O	Output Output value. (representation in the CFC: right side of the block)
IO	Input/output Reacting input that can be written by the OS and written back by the block (representation in the CFC: left side of block)

- **Attr.** (attributes)
Additional characteristics of the parameter when used in CFC. Input and output parameters that are not interconnected can have parameters assigned (input/output parameters only with online FCs).
Output parameters can not have values assigned and can be transferred in CFC by interconnecting them to an input of the same data type.
Additional or deviating properties of the parameter are indicated as follows:

Abbr.	Attribute
Q	Interconnectable The I/O can be interconnected with another output of the same type.
U	Invisible in CFC The I/O is not displayed in CFC (for example, the message ID), since this is supplied by the block itself or by the OS block. This default setting can be changed in the CFC.

- **OCM**
Parameters marked with "+" can be controlled or monitored via the relevant OS block.
- **Permitted Values**
Additional limitation within the value range of the data type

Operating control and monitoring of ...

If an OS block exists for the PLC block, the fields on the faceplate are described in the table.

2 BATCH-Interface Blocks

2.1 IEPH: Equipment Phase - BATCH Interface

Object Name (Type + Number)

FB 254

Calling OBs

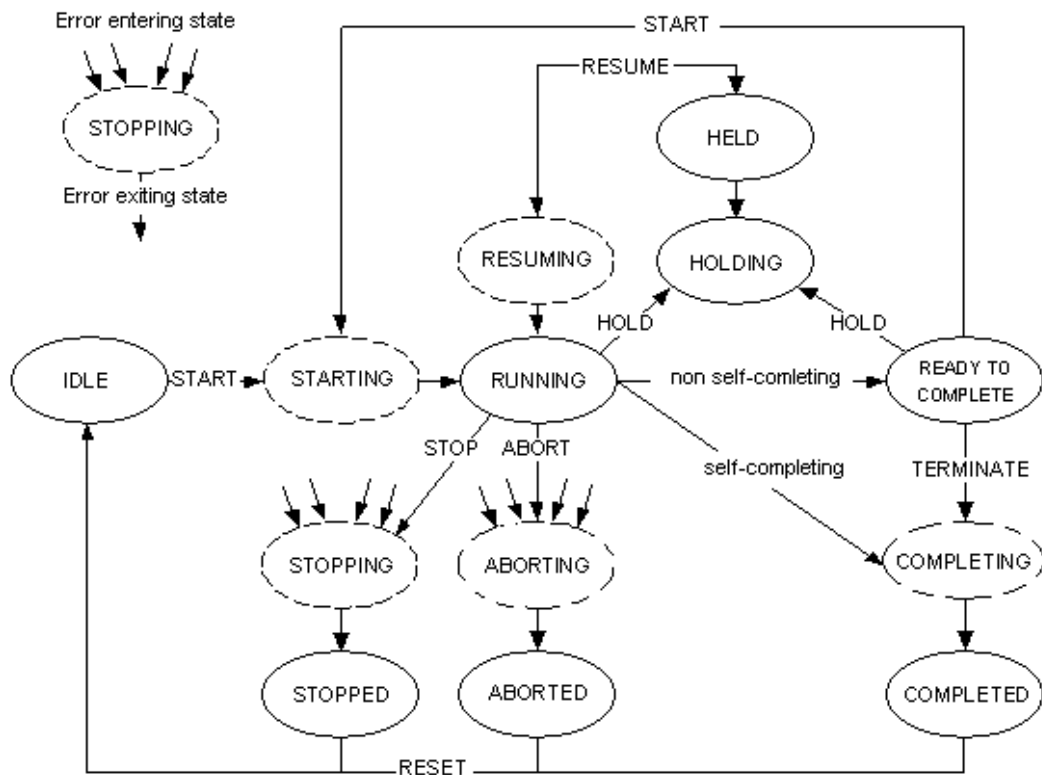
The OB in which you install the block (for example, OB1).

Function

The IEPH block serves as the interface between a BATCH recipe step of the type RPH (recipe phase) and the user programs on the automation system for control and status information. The IEPH block is used to pass on the batch control commands to the user program (basic function blocks) and the status messages of the user encoded in the status word of the IEPH block for batch control.

The setpoints are set and the process values adopted via the parameter blocks (IEPAR_...) underlying the IEPH block. To allow this, the IEPAR blocks are interconnected with the EPE_CONN output of IEPH. Via this output, there is also check to establish whether the configured IEPH block instance and the IEPAR block instances match the definition of the phase type. The name of the phase type is located in the F_TYPE input parameter of the IEPH block.

The IEPH block allows the following status changes:



How the Block Functions

- Occupy/release

A recipe step can occupy the block by setting the identifier OCCUPIED = 1. It also enters the batch name, the batch number, the step number (UBA_NAME, UBA_ID, USTEP_NO) and if necessary, the step monitoring time (STEP_T) as additional occupation information. The block is occupied only when it is released for BATCH (BA_EN = 1), is set to automatic (status word bit 17 = 1), and there is no group error (status word bit 31 = 0).

- Control Commands

The block is controlled via the control inputs ISTART, IHOLD, IABORT, ISTOP, ITERM, IRESET (for interconnection from a CFC chart) or via the control word ICTRL (used only by BATCH). The pending control commands can be read at the corresponding outputs, for example, QSTART and QHOLD. The ICTRL control word allows BATCH to write consistent control commands. Example: ICTRL = 1 ensures simultaneous writing with ISTART = 1 and IHOLD = 0. The control inputs are reset automatically when the appropriate end status is reached (for example, ISTART is reset with the positive edge of the RUNNING bit in USTAT_L).

- Status Word

The user block connected to the IEPH block signals the reaction to operator input via the status input USTAT_L. The status – along with other block information – is available at the QUSTAT_L output and is monitored by BATCH. The bit assignment matches that of the SFC_CTRL block.

- Non Self-Terminating Operation

With the READY bit in the status, the block informs BATCH that it will not terminate itself, but that this must be done by BATCH. When using the SFC_CTRL block that has no READY status, the READY bit can be set via the IREADY input.

- Runtime Monitoring

A positive edge from RUNNING status increments the step time at one second intervals. The COMPLETED status stops the timer. If the process value (Q_STEP_T) exceeds the setpoint (STEP_T), the "Run time exceeded" identifier (bit 19) is set in the status. The runtime monitoring is taken as a message in WinCC, it does **not** lead to a group error.

Note:

Identifier "SFC: Error step run time" is used internally in SFC and causes a group error.

- Trigger for reading setpoints/process values

When the block is active, the user program can set the IREFRESH trigger signal in QUSTAT_L by creating a rising edge at the IREFRESH input. This causes BATCH to read all the setpoints and process values immediately and to archive these in the batch data for later logging.

- Trigger for checking and setting new setpoints

When writing new setpoints, BATCH sets input IPARAM. The master recipe phase recognizes this at the corresponding output QPARAM and can check and adopt the setpoints. If the check is negative, the master recipe phase can either signal an error or can prevent the start via the "ILOCK" input. BATCH resets the IPARAM input when the equipment phase starts. This is possible, for example, in conjunction with a change of control strategy.

- Start Lock

With the "Start lock" identifier in the status word or through the "ILOCK" input, the block can inform BATCH that a start or resumption is not wanted.

Note:

For BATCH to react to the start lock, it must already be in the IDLE status. When the start lock is set, BATCH makes the allocation, initially writes the setpoints only and waits with the start command until the block resets the start lock.

- Continuous Operation or Bumpless Switching

In continuous operation, two recipe steps use the same block one after the other without terminating the block. The block simply signals READY at the end of the first run. BATCH then sets the status ID for continuous operation via the ICONT input instead of terminating the block with ITERM. You configure this when creating the recipe. When the second recipe step is activated, ICONT is reset.

Continuous operation or bumpless switching is possible only with a non self-terminating recipe phase.

Assignments for ICTRL

Bit	Meaning
0	ISTART
1	IHOLD
2	IABORT
3	IRESET
4	ITERM
5	reserved
6	ISTOP
7	reserved
8	ICONT
9	IPARAM

ICTRL contains all the operator inputs written by Batch.

IREADY, ILOCK and IREFRESH are used by the **user program** and are not therefore included in ICTRL.

Assignments for Status Words USTAT_L and QUSTAT_L

Bit	Meaning	Remarks	Set when
0	IDLE	Static status "inactive"	
1	RUNNING	Static status "running"	
2	COMPLETED	Static status "completed"	
3	HELD	Static status "held"	
4	ABORTED	Static status "aborted"	
5	READY	Static status "Ready to complete"	IREADY = 1
6	STOPPED	Static status "stopped"	
7	free	-	
8	free	-	
9	STARTING	Transitional status "starting"	
10	RESUMING	Transitional status "resuming"	
11	COMPLETING	Transitional status "completing"	
12	HOLDING	Transitional status "holding"	
13	ABORTING	Transitional status "aborting"	
14	STOPPING	Transitional status "stopping"	
15	free	-	
16	reserved	(for SFC: Manual/automatic requested)	
17	QCMOD	Identifier: Manual/automatic (1 = automatic)	
18	BA_EN	Identifier: BATCH Enable (1 = enabled)	BA_EN = 1
19	STEP_RT	Identifier run time exceeded	Q_STEP_T > STEP_T
20	reserved	(for SFC: Transition operator prompt)	
21	REFRESH	Trigger for reading setpoints/process values	IREFRESH = 1
22	LOCK	Identifier: Start lock (1 = locked)	ILOCK = 1
23	CONTINUOUS	Identifier: Continuous mode	ICONT = 1
24	OCCUPIED	Identifier: BATCH Allocation (1 = allocated)	OCCUPIED = 1
25	PROC_ERR	(for SFC: Process error)	
26	reserved	(for SFC: Execution error)	
27	reserved	(for SFC: Step runtime error)	
28	reserved	(for SFC: Configuration error)	
29	reserved	(for SFC: Operator error)	
30	reserved	(for SFC: External error)	
31	ERROR	Group error	

Rules for Setting the Status Bits

- The most important states for BATCH are the static states. The transitional states are optional. For example, the RUNNING state can immediately follow the IDLE state..
- A maximum of 1 static status and 1 transitional status can be active at any one time.

Example:

permitted:	HELD alone
permitted:	ABORTING alone
permitted:	HELD and ABORTING (helpful to still be able to identify the original status)
forbidden:	HELD and ABORTED
forbidden:	HOLDING and ABORTING

Note:

Exception: When the IREADY input is used, READY can be added to another static state.

- Group error (bit 31) can be set at any time in addition to all other states.
- With entries in the "Set when" column, the corresponding bit does not need to be set in USTAT_L.

Batch Messages

The auxiliary values are allocated by the block as follows:

Auxiliary value 1 = batch name	UBA_NAME
Auxiliary value 2 = step number	USTEP_NO
Auxiliary value 3 = batch ID	UBA_ID

Block Parameters	Value	Event	Message Class
QUSTAT_L bit 1	1	Phase running	Status message - PLC
QUSTAT_L bit 2	1	Phase completed	Status message - PLC
QUSTAT_L bit 3	1	Phase held	Status message - PLC
QUSTAT_L bit 4	1	Phase aborted	Status message - PLC
QUSTAT_L bit 5	1	Function ready to complete	Status message - PLC
QUSTAT_L bit 6	1	Phase stopped	Status message - PLC
QUSTAT_L bit 17	0	Function in manual	Status message - PLC
QUSTAT_L bit 18	0	Function not enabled for BATCH	Status message - PLC
QUSTAT_L bit 19	1	Phase run time exceeded	Status message - PLC
QUSTAT_L bit 31	1	Phase error	AS process control message

Additional Information

- Section "I/Os of IEPH"
- Section "Operator Control and Monitoring of IEPH"

2.1.1 I/Os of IEPH

I/O (Parameter)	Meaning	Type	Default	I/O	Attr.	OCM	Permitted Values
BA_EN	BATCH-occupy enable	Bool	1	I		+	
EPE_CONN	Interconnection with IEPAR blocks	DInt	0	O		-	
F_TYPE	Name of the phase type	String[16]	“	I		+	
IABORT	Operator input: Abort	Bool	0	IO		+	
ICONT	Sets the CONTINUOUS ID in the status word	Bool	0	IO		+	
ICTRL	Control word for operator inputs	DWord	0	I	Q	+	
IHOLD	Operator input: Hold	Bool	0	IO		+	
ILOCK	Sets the start lock ID in the status word	Bool	0	IO		+	
IPARAM	New parameter set from batch control	Bool	0	IO		+	
IREADY	Sets the READY status bit in the status word	Bool	0	IO		+	
IREFRESH	Sets the REFRESH ID in the status word	Bool	0	IO	QU	+	
IRESET	Operator input: Reset	Bool	0	IO		+	
ISTART	Operator input: Start	Bool	0	IO		+	
ISTOP	Operator input: Stop	Bool	0	IO		+	
ITERM	Operator input: Complete	Bool	0	IO		+	
OCCUPIED	BATCH allocation ID	Bool	0	I	U	+	
Q_OCCUPI	Copy of OCCUPIED	Bool	0	O		-	
Q_STEP_T	Process value of step run time	DInt	0	O	U	+	
QABORT	Copy of IABORT	Bool	0	O		-	
QBA_EN	Copy of BA_EN	Bool	1	O		+	
QCONT	Copy of ICONT	Bool	0	O		-	
QHOLD	Copy of IHOLD	Bool	0	O		-	
QLOCK	Copy of ILOCK	Bool	0	O		-	
QPARAM	Copy of IPARAM	Bool	0	O		-	
QREADY	Copy of IREADY	Bool	0	O		-	
QREFRESH	Copy of IREFRESH	Bool	0	O		-	
QRESET	Copy of IRESET	Bool	0	O		-	
QSTART	Copy of ISTART	Bool	0	O		-	
QSTOP	Copy of ISTOP	Bool	0	O		-	
QTERM	Copy of ITERM	Bool	0	O		-	
QUSTAT_L	Status word output	DWord	0	O		+	
STEP_T	Setpoint for step run time in seconds	DInt	0	I	U	+	
UBA_ID	Batch ID	DWord	0	I		+	
UBA_NAME	Batch name	String[32]	“	I		+	

I/O (Parameter)	Meaning	Type	Default	I/O	Attr.	OCM	Permitted Values
ULOOP_I	Number of step activations (for loops)	Word	1	I	U	+	
USTAT_L	Status word input	DWord	0	I	Q	-	
USTEP_NO	Step number in recipe	DWord	0	I	U	+	
VBA_ID	Copy of UBA_ID	DWord	0	O		+	
VBA_NAME	Copy of UBA_NAME	String[32]	“	O		+	
VLOOP_I	Copy of ULOOP_I	Word	0	O		+	
VSTEP_NO	Copy of USTEP_NO	DWord	0	O		+	

Additional Information

- Section "Overview of the Block Description"

2.1.2 Operator Control and Monitoring of IEPH

The following table shows the assignment of the parameters of the IEPH block to the input/output fields of the corresponding faceplates for the following views:

- Function
- Batch
- Setpoints
- Materials

View	Input/output field	Operator permission	Parameter of the block
Function	"Status" display	-	QUSTAT_L
	• LED "Runtime error"	-	QUSTAT_L bit 19
	• "Error" LED	-	QUSTAT_L bit 31
	• LED "Manual"	-	QUSTAT_L bit 17 (if = 0)
	• "T", "H", "B" buttons: Status in string, hexadecimal, and binary	-	-
	Operator input and display "Phase":		
	• Enabled for BATCH		BA_EN bit 18
	• Occupy		OCCUPIED bit 24
	• "Start" button	Only available when a batch is not released and is allocated if WinCC sets an operator permission 5 or 6 is set	ISTART or ICTRL bit 0
	• "Abort" button		IABORT or ICTRL bit 2
	• "Stop" button		ISTOP or ICTRL bit 6
	• "Hold" button		IHOLD or ICTRL bit 1
	• "Complete" button		ITERM or ICTRL bit 4
	• "Reset" button		IRESET or ICTRL bit 3
	• "Resume" button		ISTART or ICTRL bit 0

View	Input/output field	Operator permission	Parameter of the block
Batch	"Status" display	-	QUSTAT_L
	"T", "H", "B" buttons: Status in string, hexadecimal, and binary	-	-
	Operator input and display "Batch":		
	Enabled for BATCH	-	BA_EN bit 18
	Occupy	-	OCCUPIED bit 24
	Batch no.	-	VBA_ID
	Batch name	-	VBA_NAME
	Step no.	-	VSTEP_NO
	Step time	-	STEP_T
	No. of loops	-	VLOOP_I
	Average no. of steps	-	Q_STEP_T

View	Input/output field	Operator permission	Parameter of the block
Setpoints	Enabled for BATCH	-	BA_EN bit 18
	Tabular display of the setpoints, such as setpoint, process value, physical unit and parameter name	-	Each row in the list box represents an IEPAR block that is interconnected at the EPE_CONN input.

View	Input/output field	Operator permission	Parameter of the block
Materials	Enabled for BATCH	-	BA_EN bit 18
	Tabular display of materials: all outputs of the IEPAR_PI and IEPAR_PO blocks are displayed	-	Each row of the list box contains an input material or an output material.

Setting operator permission

"In the "Properties" tab of the object properties for the IUNIT and IEPH/IEOP faceplates, under "Others" the operator-control enable has to be set to "Yes".

The operator must have explicit permission for the object to be available. The permission levels for individual operators are set in the User Administrator of the WinCC Explorer:

- The operator-control enable requires the authorization level 5 (process controlling) or the level 6 (higher process controlling).
- You can enable the permission levels as follows:
 - Generally for all units ("Enable" column in the User Administrator)
 - For specific units ("<Unit Name>" column in the User Administrator)

Creating Batch Faceplates from Templates

In the Graphics Designer (WinCC Explorer), there is a template for selecting Batch faceplates in PCS 7 OS pictures.

1. Open the desired process picture in the Graphics Designer.
2. Select the menu command **File > Open** to open the template file "@Template_Batch.pdl".
3. Use the "IEPH" block icon to display the equipment phases in the faceplate.
4. Select the block icon in the template file and copy it into your process picture.
5. Select the block icon in your process picture.
6. In the window of the Dynamic Wizard, double click on the PCS 7 function "Connect faceplate to process tag" under "Standard Dynamics".
7. In the Dynamic Wizard, click "Next" and then click the find function "...".
8. All instanced blocks are displayed in the tag selection dialog. Select the desired block and click **OK > Next > Finish**.

Result: The process picture you have edited features the "IEPH" block icon which is used to call up the corresponding faceplate.

2.2 IEOP: Equipment Operation - BATCH Interface

Object Name (Type + Number)

FB 253

Calling OBs

The OB in which you install the block (for example, OB1).

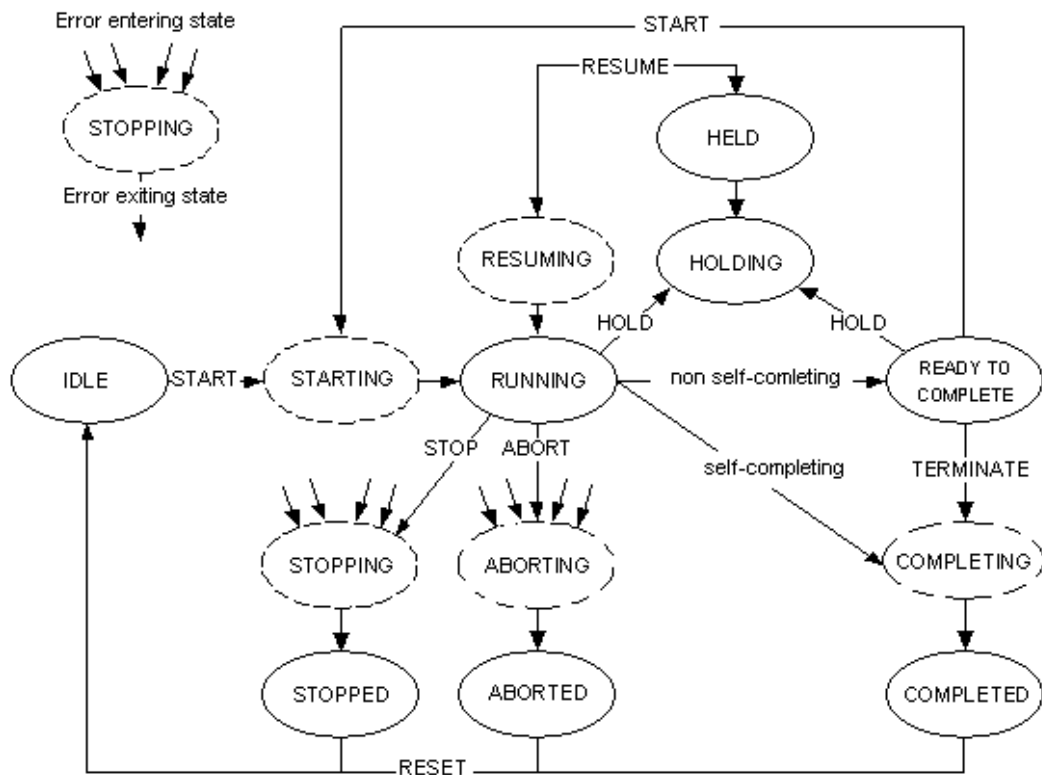
Function

The IEOP block is used when complex functions must be implemented in the automation system and these are to be executed in the BATCH recipe as a recipe operation step.

The IEOP block serves as an alternative to the BATCH recipe step of the ROP (recipe operation) type; a ROP thus runs completely separate in the automation system. The IEOP is installed directly at the position of the ROP in the recipe. On the one hand, the IEOP block is used to pass on the batch control commands to the user program, and on the other hand, the process values from the process are collected and passed on to batch control.

Setpoints are set and the process values adopted via the parameter blocks (IEPAR_...) underlying the IEOP block. To allow this, the IEPAR blocks are interconnected with the EPE_CONN output of IEOP. Via this output, there is also check later to establish whether the configured IEOP block instance and the IEPAR block instances match the definition of the phase type. The name of the phase type is located in the F_TYPE input parameter of the IEOP block.

The block allows the following status changes:



How the Block Functions

- Occupy/release

A recipe step can occupy the block by setting the identifier OCCUPIED = 1. It also enters the batch name, the batch number, the step number (UBA_NAME, UBA_ID, USTEP_NO) and if necessary, the step monitoring time (STEP_T) as additional occupation information. The block is occupied only when it is released for BATCH (BA_EN = 1), is set to automatic (status word bit 17 = 1), and there is no group error (status word bit 31 = 0).

- Control Commands

The block is controlled via the control inputs ISTART, IHOLD, IABORT, ISTOP, ITERM, IRESET (for interconnection from a CFC chart) or via the control word ICTRL (used only by BATCH). The pending control commands can be read at the corresponding outputs, for example, QSTART. The ICTRL control word allows BATCH to write consistent control commands. Example: ICTRL = 1 ensures simultaneous writing with ISTART = 1 and IHOLD = 0. The control inputs are reset automatically when the appropriate end status is reached (for example, ISTART is reset with the positive edge of the RUNNING bit in USTAT L).

- Status Word

The user block connected to the IEOP signals the reaction to operator input via the status input USTAT_L. The status – along with other block information – is available at the QUSTAT_L output and is monitored by BATCH. The bit assignment matches that of the SFC_CTRL block.

- Non Self-Terminating Operation

With the READY bit in the status, the block informs BATCH that it will not terminate itself, but that this must be done by BATCH. When using the SFC_CTRL block that has no READY status, the READY bit can be set via the IREADY input.

- Runtime Monitoring

A positive edge from RUNNING status increments the step time at one second intervals. The COMPLETED status stops the timer. If the process value (Q_STEP_T) exceeds the setpoint (STEP_T), the "Run time exceeded" identifier (bit 19) is set in the status. The runtime monitoring is taken as a message in WinCC, it does **not** lead to a group error.

Note:

The identifier "SFC:
Error step run time" is used internally in SFC and causes a group error.

- Trigger for reading setpoints/process values

When the block is active, the user program can set the IREFRESH trigger signal in QUSTAT_L by creating a rising edge at the IREFRESH input. This causes BATCH to read all the setpoints and process values immediately and to archive these in the batch data for later logging.

- Trigger for checking and setting new setpoints

When writing new setpoints, BATCH sets input IPARAM. The master recipe phase recognizes this at the corresponding output QPARAM and can check and adopt the setpoints. If the check is negative, the master recipe phase can either signal an error or can prevent the start via the "ILOCK" input. BATCH resets the IPARAM input when the equipment phase starts. This is possible, for example, in conjunction with a change of control strategy.

- Start Lock

With the "Start lock" identifier in the status word or through the "ILOCK" input, the block can inform BATCH that a start or resumption is not wanted.

Note:

For BATCH to react to the start lock, it must already be in the IDLE status. When the start lock is set, BATCH makes the allocation, initially writes the setpoints only and waits with the start command until the block resets the start lock.

- Continuous Operation or Bumpless Switching

In continuous operation, two recipe steps use the same block one after the other without terminating the block. The block simply signals READY at the end of the first run. BATCH then sets the status ID for continuous operation via the ICONT input instead of terminating the block with ITERM. When the second recipe step is activated, ICONT is reset.

"Continuous operation or bumpless switching" is possible only with a non self-terminating recipe phase.

Assignments for ICTRL

Bit	Meaning
0	ISTART
1	IHOLD
2	IABORT
3	IRESET
4	ITERM
5	reserved
6	ISTOP
7	reserved
8	ICONT
9	IPARAM

ICTRL contains all the operator inputs written by Batch.

IREADY, ILOCK and IREFRESH are used by the **user program** and are not therefore included in ICTRL.

Assignments for Status Words USTAT_L and QUSTAT_L

Bit	Meaning	Remarks	Set when
0	IDLE	Static status "inactive"	
1	RUNNING	Static status "running"	
2	COMPLETED	Static status "completed"	
3	HELD	Static status "held"	
4	ABORTED	Static status "aborted"	
5	READY	Static status "Ready to complete"	IREADY = 1
6	STOPPED	Static status "stopped"	
7	free	-	
8	free	-	
9	STARTING	Transitional status "starting"	
10	RESUMING	Transitional status "resuming"	
11	COMPLETING	Transitional status "completing"	
12	HOLDING	Transitional status "holding"	
13	ABORTING	Transitional status "aborting"	
14	STOPPING	Transitional status "stopping"	
15	free	-	
16	reserved	(for SFC: Manual/automatic requested)	
17	QCMOD	Identifier: Manual/automatic (1 = automatic)	
18	BA_EN	Identifier: BATCH - enable (1 = enabled)	BA_EN = 1
19	STEP_RT	Identifier: Run time exceeded	$Q_STEP_T > STEP_T$
20	reserved	(for SFC: operator prompt transition)	
21	REFRESH	Trigger for reading setpoints/process values	IREFRESH = 1
22	LOCK	Identifier: Start lock (1 = locked)	ILOCK = 1
23	CONTINUOUS	Identifier: Continuous mode	ICONT = 1
24	OCCUPIED	Identifier: BATCH Allocation (1 = allocated)	OCCUPIED = 1
25	PROC_ERR	(for SFC: Process error)	
26	reserved	(for SFC: Execution error)	
27	reserved	(for SFC: Step runtime error)	
28	reserved	(for SFC: Configuration error)	
29	reserved	(for SFC: Operator error)	
30	reserved	(for SFC: External error)	
31	ERROR	Group error	

Rules for Setting the Status Bits

- The most important states for BATCH are the static states. The transitional states are optional. For example, the RUNNING state can immediately follow the IDLE state..
- A maximum of 1 static status and 1 transitional status can be active at any one time.

Example:

permitted:	HELD alone
permitted:	ABORTING alone
permitted:	HELD and ABORTING (helpful to still be able to identify the original status)
forbidden:	HELD and ABORTED
forbidden:	HOLDING and ABORTING

Note:

Exception: When the IREADY input is used, READY can be added to another static state.

- Group error (bit 31) can be set at any time in addition to all other states.
- With entries in the "Set when" column, the corresponding bit does not need to be set in USTAT_L.

Batch Messages

The auxiliary values are allocated by the block as follows:

Auxiliary value 1 = batch name	UBA_NAME
Auxiliary value 2 = step number	USTEP_N0
Auxiliary value 3 = batch ID	UBA_ID

Block Parameters	Value	Event	Message Class
QUSTAT_L bit 1	1	Operation running	Status message - PLC
QUSTAT_L bit 2	1	Operation completed	Status message - PLC
QUSTAT_L bit 3	1	Operation held	Status message - PLC
QUSTAT_L bit 4	1	Operation aborted	Status message - PLC
QUSTAT_L bit 5	1	Operation ready to stop	Status message - PLC
QUSTAT_L bit 6	1	Operation stopped	Status message - PLC
QUSTAT_L bit 17	0	Operation in manual	Status message - PLC
QUSTAT_L bit 18	0	Operation not enabled for BATCH	Status message - PLC
QUSTAT_L bit 19	1	Operation run time exceeded	Status message - PLC
QUSTAT_L bit 31	1	Operation error	AS process control message

Additional Information

- Section "I/Os of IEOP"
- Section "Operator Control and Monitoring of IEOP"

2.2.1 I/Os of IEOP

I/O (Parameter)	Meaning	Type	Default	I/O	Attr.	C&M	Permitted Values
BA_EN	BATCH-occupy enable	Bool	1	I		+	
EPE_CONN	Interconnection with IEPAR blocks	DInt	0	O		-	
F_TYPE	Name of the phase type	String[16]	“	I		+	
IABORT	Operator input: Abort	Bool	0	IO		+	
ICONT	Sets the CONTINUOUS ID in the status word	Bool	0	IO		+	
ICTRL	Control word for operator inputs	DWord	0	I	Q	+	
IHOLD	Operator input: Hold	Bool	0	IO		+	
ILOCK	Sets the start lock ID in the status word	Bool	0	IO		+	
IPARAM	New parameter set from batch control	Bool	0	IO		+	
IREADY	Sets the READY status bit in the status word	Bool	0	IO		+	
IREFRESH	Sets the REFRESH ID in the status word	Bool	0	IO	QU	+	
IRESET	Operator input: Reset	Bool	0	IO		+	
ISTART	Operator input: Start	Bool	0	IO		+	
ISTOP	Operator input: Stop	Bool	0	IO		+	
ITERM	Operator input: Complete	Bool	0	IO		+	
OCCUPIED	BATCH allocation ID	Bool	0	I	U	+	
Q_OCCUPI	Copy of OCCUPIED	Bool	0	O		-	
Q_STEP_T	Process value of step run time	DInt	0	O	U	+	
QABORT	Copy of IABORT	Bool	0	O		-	
QBA_EN	Copy of BA_EN	Bool	1	O		+	
QCONT	Copy of ICONT	Bool	0	O		-	
QHOLD	Copy of IHOLD	Bool	0	O		-	
QLOCK	Copy of ILOCK	Bool	0	O		-	
QPARAM	Copy of IPARAM	Bool	0	O		-	
QREADY	Copy of IREADY	Bool	0	O		-	
QREFRESH	Copy of IREFRESH	Bool	0	O		-	
QRESET	Copy of IRESET	Bool	0	O		-	
QSTART	Copy of ISTART	Bool	0	O		-	
QSTOP	Copy of ISTOP	Bool	0	O		-	
QTERM	Copy of ITERM	Bool	0	O		-	
QSTAT_L	Status word output	DWord	0	O		+	
STEP_T	Setpoint for step run time in seconds	DInt	0	I	U	+	
UBA_ID	Batch ID	DWord	0	I		+	
UBA_NAME	Batch name	String[32]	“	I		+	

I/O (Parameter)	Meaning	Type	Default	I/O	Attr.	C&M	Permitted Values
ULOOP_I	Number of step activations (for loops)	Word	1	I	U	+	
USTAT_L	Status word input	DWord	0	I	Q	-	
USTEP_NO	Step number in recipe	DWord	0	I	U	+	
VBA_ID	Copy of UBA_ID	DWord	0	O		+	
VBA_NAME	Copy of UBA_NAME	String[32]	“	O		+	
VLOOP_I	Copy of ULOOP_I	Word	0	O		+	
VSTEP_NO	Copy of USTEP_NO	DWord	0	O		+	

Additional Information

- Section "Overview of the Block Description"

2.2.2 Operator Control and Monitoring of IEOP

The following table shows the assignment of the parameters of the IEOP block to the input/output fields of the corresponding faceplates for the following views:

- Function
- Batch
- Setpoints
- Materials

View	Input/output field	Operator permission	Parameter of the block
Function	"Status" display	-	QUSTAT_L
	• LED "Runtime error"	-	QUSTAT_L bit 19
	• "Error" LED	-	QUSTAT_L bit 31
	• LED "Manual"	-	QUSTAT_L bit 17 (if = 0)
	• "T", "H", "B" buttons: Status in string, hexadecimal, and binary	-	-
	Operator input and display "Phase":		
	• Enabled for BATCH		BA_EN bit 18
	• Occupy		OCCUPIED bit 24
	• "Start" button	only enabled if a batch is not released and allocated, if WinCC sets an operator permission 5 or 6.	ISTART or ICTRL bit 0
	• "Abort" button		IABORT or ICTRL bit 2
	• "Stop" button		ISTOP or ICTRL bit 6
	• "Hold" button		IHOLD or ICTRL bit 1
	• "Complete" button		ITERM or ICTRL bit 4
	• "Reset" button		IRESET or ICTRL bit 3
	• "Resume" button		ISTART or ICTRL bit 0

View	Input/output field	Operator permission	Parameter of the block
Batch	"Status" display	-	QUSTAT_L
	"T", "H", "B" buttons: Status in string, hexadecimal, and binary	-	-
	Operator input and display "Batch":		
	Enabled for BATCH	-	BA_EN bit 18
	Occupy	-	OCCUPIED bit 24
	Batch no.	-	VBA_ID
	Batch name	-	VBA_NAME
	Step no.	-	VSTEP_NO
	Step time	-	STEP_T
	No. of loops	-	VLOOP_I
	Average no. of steps	-	Q_STEP_T

View	Input/output field	Operator permission	Parameter of the block
Setpoints	Enabled for BATCH	-	BA_EN bit 18
	Tabular display of setpoints: such as setpoint, process value, physical unit and parameter name	-	Each row in the list box represents an IEPAR block that is interconnected at the EPE_CONN input.

View	Input/output field	Operator permission	Parameter of the block
Materials	Enabled for BATCH	-	BA_EN bit 18
	Tabular display of materials: all outputs of the IEPAR_PI and IEPAR_PO blocks are displayed	-	Each row of the list box contains an input material or an output material.

Setting operator permission

"In the "Properties" tab of the object properties for the IUNIT and IEPH/IEOP faceplates, under "Others" the operator-control enable has to be set to "Yes".

- Yes - the object is available in process mode
- No - the object is not available in process mode

The operator must have explicit permission for the object to be available. The permission levels for individual operators are set in the User Administrator of the WinCC Explorer:

- Only levels 5 (operator process control) and 6 (higher-order operator process control) can be selected.
- You can enable the permission levels as follows:
 - Generally for all units ("Enable" column in the User Administrator)
 - For specific units ("<Unit Name>" column in the User Administrator)

Creating Batch Faceplates from Templates

In the Graphics Designer (WinCC Explorer), there is a template for selecting Batch faceplates in PCS 7 OS pictures.

1. Open the desired process picture in the Graphics Designer.
2. Select the menu command **File > Open** to open the template file "@Template_Batch.pdl".
3. Use the "IEOP" block icon to display the equipment operations in the faceplate.
4. Select the block icon in the template file and copy it into your process picture.
5. Select the block icon in your process picture.
6. In the window of the Dynamic Wizard, double click on the PCS 7 function "Connect faceplate to process tag" under "Standard Dynamics".
7. In the Dynamic Wizard, click "Next" and then click the find function "...".
8. All instanced blocks are displayed in the tag selection dialog. Select the desired block and click **OK > Next > Finish**.

Result: The process picture you have edited features the "IEOP" block icon which is used to call up the corresponding faceplate.

2.3 TAG_COLL: TAG_Collect - BATCH Interface

Object Name (Type + Number)

FB 252

Calling OBs

The OB in which you install the block (for example, OB1).

Function

The block serves as a collector block for the IEPARs that are used in transition conditions in the BATCH recipe editor and that are not available as IEPAR in the IEPH. Process tags can also be included as parameters that are used in the batch measured value acquisition. The parameters of TAG_COLL are purely process values and the SP_VAL inputs are therefore not written. Only ACT_VAL and QACT_VAL are significant.

How the Block Functions

Display only

Additional Information

- Section I/Os of TAG_COLL"

2.3.1 I/Os of TAG_COLL

I/O (Parameter)	Meaning	Type	Default	I/O	Attr.	C&M	Permitted Values
EPE_CONN	Interconnection with IEPAR blocks	DInt	0	O			
F_TYPE	Name of the process tag type	String[16]	"	I		+	

Additional Information

- Section "Overview of the Block Description"

2.4 IUNIT_BLOCK: Unit Allocation - BATCH Interface

Object Name (Type + Number)

FB 251

Calling OBs

The OB in which you install the block (for example, OB1).

Function

Using IUNIT_BLOCK, batch control coordinates the allocation of individual units to the active batches. An IUNIT_BLOCK, an instance in one of the charts of the hierarchy folder, is required for each unit. The unit name is configured at the UNIT_NAME input.

How the Block Functions

- Occupy/release

The batch control set the identifier OCCUPIED = 1 to allocate a unit. It also enters the allocation information as follows:

- Batch name, batch ID (UBA_NAME, UBA_ID),
- Recipe name, recipe version, formula (URP_NAME, URP_REL, FORMULA),
- Material name and material ID (MAT_NAME, MAT_SP) of the product produced in the batch.

The block is occupied only when it is enabled for BATCH (*BA_EN = 1*) and there is no group error (*status word bit 31 = 0*).

When it is enabled, only the OCCUPIED identifier is set to 0. A The other occupation information about the product are maintained and can be used in the user program and for planning other batches. For example, if the same product is being produced, no cleaning batch needs to be inserted between two batches.

- Status Word

The status of IUNIT_BLOCK is entered in the Q_STATUS status word and is monitored by BATCH.

- User Status Word

The USER_STATUS is a status word that can be set by other PCS 7 applications and it is available on the PCS 7 OS as QUSER_STATUS. There, it can be queried in the programs of other applications. The status word must not be used in a user program.

- Sign-of-life Monitoring

At intervals that can be set within BATCH, the batch control sends a lifebeat to all allocated IUNIT_BLOCK blocks to signal to the block that the PLC-OS connection still exists and that the batch control is still working.

If the "Lifebeat" does not arrive within the interface set in BATCH, the IUNIT_BLOCK sets AS_OS_ERR = 0. This allows the user program to react to the missing connection to the batch control. If the connection is reactivated (the "lifebeat" is sent again), the AS_OS_ERR output is reset to 1.

- SP_COUNT = 0: deactivated/VA_COUNT constant 1
- SP_COUNT > 0: VA_COUNT is decremented in intervals of seconds beginning with SP_COUNT.
If VA_COUNT = 0 the monitoring time has elapsed; in other words not contact to the PCS 7 OS or batch control.
If LIFE = TRUE, monitoring is restarted at SP_COUNT.
- AS_OS_ERR constant 1, if connection OK or SP_COUNT = 0
- AS_OS_ERR constant 0, if SP_COUNT <> 0 and VA_COUNT = 0

- Deactivating a Unit

IUNIT_BLOCK allows the deliberate deactivation of the respective unit for use by batch control. The PEND_OOS (pending out of service) input sets an internal trigger. If the unit is not allocated, BA_EN is set to 0 immediately. If there is a current batch allocation (OCCUPIED = 1), IUNIT_BLOCK waits until batch control cancels the allocation and then sets BA_EN = 0.

Definition of the Q_STATUS

Bit	Meaning	Remarks
0	Step control by operator	
1	Step control by transition	
2	Step control by condition and transition	
3	Step control by condition or transition	
4	Not used	
5	Not used	
6	Step control mode affects phase level	
7	Step control mode affects operation level	
8		Bits 8 to 15: identical to RUP_STAT
9		
10		
11		
12		
13		
14		
15		
16	reserved	
17	reserved	
18	reserved	
19	reserved	
20	reserved	
21	reserved	
22	free	
23	free	
24	OCCUPIED	IUNIT_BLOCK is allocated
25	BA_EN	Enabled for BATCH
26	PEND_OOS	Pending out of service; At the next opportunity (allocation rescinded), BA_EN = 0 is set.
27	free	
28	free	
29	free	
30	free	
31	reserved	

Batch Messages

Block Parameters	Value	Event	Message Class
Q_STATUS bit 24	1	Unit allocated	Status message - PLC
Q_STATUS bit 24	0	Unit released	Status message - PLC
Q_STATUS bit 25	0	Unit not released for batch	Status message - PLC
Q_STATUS bit 26	1	Unit requested for maintenance	Status message - PLC
Q_STATUS bit 31	1	Unit error	AS process control message
MSG_OR	1	Batch operator input required	Operator prompt

Additional Information

- Section "I/Os of IUNIT_BLOCK"
- Section "Operator Control and Monitoring of IUNIT_BLOCK"

2.4.1 I/Os of IUNIT_BLOCK

I/O (Parameter)	Meaning	Type	Default	I/O	Attr.	C&M	Permitted Values
AS_OS_ERR	Sign-of-life Monitoring	Bool	0	O	U	+	
BA_EN	BATCH - occupy enable	Bool	1	IO		+	
FORMULA	Formula	String[32]	“	I		+	
ICTRL	(not used)	Byte	0	I	Q	+	
LIFE	Sign-of-life bit (SP_COUNT is applied to VA_COUNT)	Bool	0	IO	QU	+	
MAT_NAME	Material name	String[32]	“	I		+	
MAT_SP	Material ID of the batch product	String[16]	“	I		+	
MSG_OR	Trigger operator prompt	Bool	0	I	U	+	
OCCUPIED	Unit allocated	Bool	0	I		+	
PEND_OOS	Pending out of service: this unit can no longer be allocation when the current allocation is completed	Bool	0	I		+	
Q_OCCUPI	Occupied	Bool	0	O			
Q_STATUS	Block status	DWord	0	O	U	+	
QMAT_SP	Copy of MAT_SP	String[16]	“	O			
QUSER_STATUS	Acquisition of USER_STATUS	Word	0	O	U	+	
RUP_STAT	(not used)	Byte	0	I	Q	+	
SP_COUNT	Setpoint sign of life interval	Int	0	I		+	
STEPMODE	(not used)	Byte	0	I	Q	+	
UBA_ID	Batch ID (input)	DWord	0	I		+	
UBA_NAME	Batch name (input)	String[32]	“	I		+	
UNIT_NAME	Unit name	String[16]	“	I		+	
URP_NAME	Recipe name, version	String[32]	“	I		+	
URP_REL	Recipe version	String[32]	“	I		+	
USER_STATUS	Free for use by PCS 7 programs	Word	0	I	U	+	
USTAT_PRIO	(not used)	Byte	0	I			
VA_COUNT	Actual Value: lifebeat interval (counts down to 0)	Int	0	O		+	
VBA_ID	Batch ID (output)	DInt	0	O		+	
VBA_NAME	Batch name (output)	String[32]	“	O		+	
VRP_NAME	Recipe name, version	String[64]	“	O		+	

Additional Information

- Section "Overview of the Block Description"

2.4.2 Operator Control and Monitoring of IUNIT_BLOCK

The following table shows the assignment of the parameters of the IUNIT_BLOCK block to the input/output fields of the corresponding faceplates for the following views: Unit allocations and phases.

View	Input/output field	Parameter of the block
Occupation	Left side:	
	"Status" display	QUSTAT_L
	Operator input and display "Batch":	
	Batch name	UBA_NAME
	• BatchID	UBA_ID
	• "Edit Charge" button: change the batch name	-
	• Product	MAT_Name
	• Recipe	URP_NAME
	• Recipe version	URP_REL
	• Formula	URP_CAT
	Operator input and display "Unit"	
	• Enabled for BATCH	BA_EN bit 25
	• Occupy	OCCUPIED bit 24
	• Maintenance	PEND_OOS bit 26
	• (maintenance display: such as in operation)	
	Right side:	
	• Buttons of the "equipment phase"	
	• "Enable" buttons	BA_EN of IEPH/IEOP
	• "Status" display	QUSTAT_L
	• Button to open the control recipe	
	• "Enable all functions" button	BA_EN of all IEPH/IEOP

Setting operator permission

"In the "Properties" tab of the object properties for the IUNIT and IEPH/IEOP faceplates, under "Others" the operator-control enable has to be set to "Yes".

- Yes - the object is available in process mode
- No - the object is not available in process mode

The operator must have explicit permission for the object to be available. The permission levels for individual operators are set in the User Administrator of the WinCC Explorer:

- Only levels 5 (operator process control) and 6 (higher-order operator process control) can be selected.
- You can enable the permission levels as follows:
 - Generally for all units ("Enable" column in the User Administrator)
 - For specific units ("<Unit Name>" column in the User Administrator)

Creating Batch Faceplates from Templates

In the Graphics Designer (WinCC Explorer), there is a template for selecting Batch faceplates in PCS 7 OS pictures.

1. Open the desired process picture in the Graphics Designer.
2. Select the menu command **File > Open** to open the template file "@Template_Batch.pdl".
3. Use the "IUNIT block icon to display unit allocation and the equipment operations and phases assigned to the unit.
4. Select the block icon in the template file and copy it into your process picture.
5. Select the block icon in your process picture.
6. In the window of the Dynamic Wizard, double click on the PCS 7 function "Connect faceplate to process tag" under "Standard Dynamics".
7. In the Dynamic Wizard, click "Next" and then click the find function "...".
8. All instanced blocks are displayed in the tag selection dialog. Select the desired block and click **OK > Next > Finish**.

Result: The process picture you have edited features the "IUNIT" block icon which is used to call up the corresponding faceplate.

3 Equipment Parameter Module

3.1 IEPAR_BOOL: Equipment Parameter Module for the Boolean Data Type

Object Name (Type + Number)

FB 256

Calling OBs

The OB in which you install the block (for example, OB1).

Function

The block is used to set the setpoints and to acquire the process values of the BOOL data type (bit variable).

How the Block Functions

The bit signal applied to the inputs SP_VAL or ACT_VAL is transferred to the outputs Q_SP_VAL or QACT_VAL respectively. SP_VAL is set typically by the batch control or the IEPH faceplate, ACT_VAL by the user program.

Additional Information

- Section "I/Os of IEPAR_BOOL"

3.1.1 I/Os of IEPAR_BOOL

I/O (Parameter)	Meaning	Type	Default	I/O	Attr.	C&M	Permitted Values
ACT_VAL	Process value (input)	Bool	0	I			
EPE_CONN	IEPH/IEOP connection	DInt	0	I			
Q_SP_VAL	Setpoint (output)	Bool	0	O		+	
QACT_VAL	Process value (output)	Bool	0	O		+	
SP_VAL	Setpoint (input)	Bool	0	I		+	

Additional Information

- Section "Overview of the Block Description"

3.2 IEPAR_DEST: Equipment Parameter Module for the DEST Data Type

Object Name (Type + Number)

FB 263

Calling OBs

The OB in which you install the block (for example, OB1).

Function

The block is used to set the setpoints and to acquire the process values of the data type double integer for the target destination (location ID).

How the Block Functions

The signal applied to the inputs SP_VAL or ACT_VAL is transferred to the outputs Q_SP_VAL or QACT_VAL respectively. SP_VAL is set typically by the batch control or the IEPH faceplate, ACT_VAL by the user program.

Additional Information

- Section "I/Os of IEPAR_DEST"

3.2.1 I/Os of IEPAR_DEST

I/O (Parameter)	Meaning	Type	Default	I/O	Attr.	OCM	Permitted Values
ACT_VAL	Process value (input)	DInt	0	I			
EPE_CONN	IEPH/IEOP connection	DInt	0	I			
Q_SP_VAL	Setpoint (output)	DInt	0	O		+	
QACT_VAL	Process value (output)	DInt	0	O		+	
SP_VAL	Setpoint (input)	DInt	0	I		+	

Additional Information

- Section "Overview of the Block Description"

3.3 IEPAR_DINT: Equipment Parameter Module for the Double Integer Data Type

Object Name (Type + Number)

FB 255

Calling OBs

The OB in which you install the block (for example, OB1).

Function

The block is used to set the setpoints and to acquire the process values of the data type double integer.

How the Block Functions

The signal applied to the inputs SP_VAL or ACT_VAL is transferred to the outputs Q_SP_VAL or QACT_VAL respectively. SP_VAL is set typically by the batch control or the IEPH faceplate, ACT_VAL by the user program.

Additional Information

- Section "I/Os of IEPAR_DINT"

3.3.1 I/Os of IEPAR_DINT

I/O (Parameter)	Meaning	Type	Default	I/O	Attr.	C&M	Permitted Values
ACT_VAL	Process value (input)	DInt	0	I			
EPE_CONN	IEPH/IEOP connection	DInt	0	I			
LOWLIMIT	Lower limit	DInt	0	I		+	LOWLIMIT < UPLIMIT
Q_SP_VAL	Setpoint (output)	DInt	0	O		+	
QACT_VAL	Process value (output)	DInt	0	O		+	
SP_VAL	Setpoint (input)	DInt	0	I		+	
UPLIMIT	Upper limit	DInt	100	I		+	

Additional Information

- Section "Overview of the Block Description"

3.4 IEPAR_ENUM: Equipment Parameter Module for the ENUM Parameter Type

Object Name (Type + Number)

FB 259

Calling OBs

The OB in which you install the block (for example, OB1).

Function

The block is used to set the setpoints and acquire the process values of enumerated data types, such as selection list and decoder.

How the Block Functions

The setpoints applied to the inputs are transferred to the outputs.

Additional Information

- Section "I/Os of IEPAR_ENUM"

3.4.1 I/Os of IEPAR_ENUM

I/O (Parameter)	Meaning	Type	Default	I/O	Attr.	C&M	Permitted Values
ACT_VAL	Process value (input)	DInt	0	I			
ENUM	Text string (input)	String[16]	"	I		+	
EPE_CONN	IEPH/IEOP connection	DInt	0	I			
Q_SP_VAL	Setpoint (output)	DInt	0	O		+	
QACT_VAL	Process value (output)	DInt	0	O		+	
SP_VAL	Setpoint (input)	DInt	0	I		+	

Additional Information

- Section "Overview of the Block Description"

3.5 IEPAR_PI: Equipment Parameter Module for Process Inputs

Object Name (Type + Number)

FB 260

Calling OBs

The OB in which you install the block (for example, OB1).

Function

The block is used to set the setpoints and acquire process values of input materials (quantity, material ID, batch ID of origin)

How the Block Functions

The setpoints applied to the inputs are transferred to the outputs.

Additional Information

- Section "I/Os of IEPAR_PI"

3.5.1 I/Os of IEPAR_PI

I/O (Parameter)	Meaning	Type	Default	I/O	Attr.	C&M	Permitted Values
ACT_VAL	Process value (input)	Real	0	I			
BA_ID_AC	Batch ID process value (input)	DInt	0	I			
BA_ID_SP	Batch ID setpoint (input)	DInt	0	I		+	
EPE_CONN	IEPH/IEOP connection	DInt	0	I			
LOWLIMIT	Lower limit	Real	0	I			LOWLIMIT < UPLIMIT
MAT_ACT	Process value material (input)	String[16]	“	I			
MAT_SP	Setpoint material (input)	String[16]	“	I		+	
Q_SP_VAL	Setpoint (output)	Real	0	O			
QACT_VAL	Process value (output)	Real	0	O		+	
QBAID_AC	Batch ID process value (output)	DInt	0	O	U	+	
QBAID_SP	Batch ID setpoint (output)	DInt	0	O		+	
QMAT_ACT	Process value material (output)	String[16]	“	O		+	
QMAT_SP	Setpoint material (output)	String[16]	“	O		+	
QTOL_ACT	Process value for tolerance (output)	Real	0	O	U		
QTOL_SP	Setpoint for tolerance (output)	Real	0	O	U		
SP_VAL	Setpoint (input)	Real	0	I		+	
UPLIMIT	Upper limit	Real	100.0	I			

Additional Information

- Section "Overview of the Block Description"

3.6 IEPAR_PO: Equipment Parameter Module for Process Outputs

Object Name (Type + Number)

FB 261

Calling OBs

The OB in which you install the block (for example, OB1).

Function

The block is used to set the setpoints and collect the process values of main, secondary, intermediate and waste products (quantity, material, batch ID of origin).

How the Block Functions

The setpoints applied to the inputs are transferred to the outputs.

Additional Information

- Section "I/Os of IEPAR_PO"

3.6.1 I/Os of IEPAR_PO

I/O (Parameter)	Meaning	Type	Default	I/O	Attr.	C&M	Permitted Values
ACT_VAL	Process value (input)	Real	0	I			
BA_ID_AC	Batch ID process value (input)	DInt	0	I			
BA_ID_SP	Batch ID setpoint (input)	DInt	0	I		+	
EPE_CONN	IEPH/IEOP connection	DInt	0	I			
LOWLIMIT	Lower limit	Real	0	I		+	LOWLIMIT < UPLIMIT
MAT_ACT	Process value material (input)	String[16]	“	I			
MAT_SP	Setpoint material (input)	String[16]	“	I		+	
Q_SP_VAL	Setpoint (output)	Real	0	O			
QACT_VAL	Process value (output)	Real	0	O		+	
QBAID_AC	Batch ID process value (output)	DInt	0	O	U	+	
QBAID_SP	Batch ID setpoint (output)	DInt	0	O		+	
QMAT_ACT	Process value material (output)	String[16]	“	O		+	
QMAT_SP	Setpoint material (output)	String[16]	“	O		+	
QTOL_ACT	Process value for tolerance (output)	Real	0	O	U		
QTOL_SP	Setpoint for tolerance (output)	Real	0	O	U		
SP_VAL	Setpoint (input)	Real	0	I		+	
TOL_ACT	Process value for tolerance (input)	Real	0	I	U		
TOL_SP	Setpoint for tolerance (input)	Real	0	I	U		
UPLIMIT	Upper limit	Real	100.0	I		+	

Additional Information

- Section "Overview of the Block Description"

3.7 IEPAR_REAL: Equipment Parameter Module for the Real Data Type

Object Name (Type + Number)

FB 257

Calling OBs

The OB in which you install the block (for example, OB1).

Function

The block is used to set the setpoints and to acquire the process values of the data type real.

How the Block Functions

The signal applied to the inputs SP_VAL or ACT_VAL is transferred to the outputs QSP_VAL or QACT_VAL respectively.

Additional Information

- Section "I/Os of IEPAR_REAL"

3.7.1 I/Os of IEPAR_REAL

I/O (Parameter)	Meaning	Type	Default	I/O	Attr.	C&M	Permitted Values
ACT_VAL	Process value (input)	Real	0	I			
EPE_CONN	IEPH/IEOP connection	DInt	0	I			
LOWLIMIT	Lower limit	Real	0	I		+	LOWLIMIT < UPLIMIT
Q_SP_VAL	Setpoint (output)	Real	0	O		+	
QACT_VAL	Process value (output)	Real	0	O		+	
SP_VAL	Setpoint (input)	Real	0	I		+	
UPLIMIT	Upper limit	Real	100.0	I		+	

Additional Information

- Section "Overview of the Block Description"

3.8 IEPAR_SOURCE: Equipment Parameter Module for the SOURCE Data Type

Object Name (Type + Number)

FB 262

Calling OBs

The OB in which you install the block (for example, OB1).

Function

The block is used to set the setpoints and to acquire the process values of the data type double integer for the source destination (location ID).

How the Block Functions

The signal applied to the inputs SP_VAL or ACT_VAL is transferred to the outputs Q_SP_VAL or QACT_VAL respectively. SP_VAL is set typically by the batch control or the IEPH faceplate, ACT_VAL by the user program.

Additional Information

- Section "I/Os of IEPAR_SOURCE"

3.8.1 I/Os of IEPAR_SOURCE

I/O (Parameter)	Meaning	Type	Default	I/O	Attr.	OCM	Permitted Values
ACT_VAL	Process value (input)	DInt	0	I			
EPE_CONN	IEPH/IEOP connection	DInt	0	I			
Q_SP_VAL	Setpoint (output)	DInt	0	O		+	
QACT_VAL	Process value (output)	DInt	0	O		+	
SP_VAL	Setpoint (input)	DInt	0	I		+	

Additional Information

- Section "Overview of the Block Description"

3.9 IEPAR_STR: Equipment Parameter Module for the STRING Parameter Type

Object Name (Type + Number)

FB 258

Calling OBs

The OB in which you install the block (for example, OB1).

Function

The block is used to set setpoints and collect process values of the string parameter type.

How the Block Functions

The bit signal applied to the inputs SP_VAL or ACT_VAL is transferred to the outputs Q_SP_VAL or QACT_VAL respectively. At the same time, SP_VAL can be converted to a number. To allow this, the string must be a numeric string and be representable with the DINT data type (+/- 2147483647). The number is applied to the Q_SP output. To activate the conversion, LOC_ID_ON = 1 must be set. With SP_ON_ERR, a number can be configured that is written to the Q_SP output when there is a conversion error.

A 1 signal is always applied to the QRESULT output when conversion is not active. If LOC_ID_ON = 1 (conversion to number), QRESULT = 0 as soon as there is a conversion error.

Additional Information

- Section "I/Os of IEPAR_STR"

3.9.1 I/Os of IEPAR_STR

I/O (Parameter)	Meaning	Type	Default	I/O	Attr.	C&M	Permitted Values
ACT_VAL	Process value (input)	String[16]	“	I			
EPE_CONN	IEPH/IEOP connection	DInt	0	I			
LOC_ID_ON	Enable string conversion	Bool	0	I	U		
Q_SP	Setpoint converted from string => DInt	DInt	0	O			
Q_SP_VAL	Setpoint (output)	String[16]	“	O		+	
QACT_VAL	Process value (output)	String[16]	“	O		+	
QRESULT	Result bit	Bool	0	O	U	+	
SP_ON_ERR	Value when converting STRING => DInt failed	DInt	0	I			
SP_VAL	Setpoint (input)	String[16]	“	I		+	

Additional Information

- Section "Overview of the Block Description"

3.10 IEPAR_TKEY: Equipment Parameter Module for the TKEY Data Type

Note:

This block is reserved for future extensions. Please do not use this block.

Object Name (Type + Number)

FB 265

Calling OBs

The OB in which you install the block (for example, OB1).

Function

The block is used to set setpoints and collect process values of the TKEY (Transfer Key) data type.

How the Block Functions

The inputs of the block are transferred to the corresponding outputs at every processing cycle:

Input		Output
SP_TSN	→	Q_SP_TSN
SP_TID	→	Q_SP_TID
SP_TC	→	Q_SP_TC
ACT_TSN	→	QACT_TSN
ACT_TID	→	QACT_TID
ACT_TC	→	QACT_TC

The inputs beginning with "SP_" are typically set by the batch control or the IEPH faceplate and the inputs beginning with "ACT_" are set by the user program.

Additional Information

- Section "I/Os of IEPAR_TKEY"

3.10.1 I/Os of IEPAR_TKEY

I/O (Parameter)	Meaning	Type	Default	I/O	Attr.	OCM	Permitted Values
EPE_CONN	IEPH/IEOP connection	DInt	0	I			
SP_TSN	Transfer Set Name from Batch	DInt	0	I		+	
SP_TID	Transfer ID from Batch	STRING	"	I		+	
SP_TC	Transfer Counter from Batch	DInt	0	I		+	
ACT_TSN	Actual Transfer Set Name	DInt	0	I			
ACT_TID	Actual Transfer ID	STRING	"	I			
ACT_TC	Actual Transfer Counter	DInt	0	I			
Q_SP_TSN	Transfer Set Name Output	DInt	0	O		+	
Q_SP_TID	Transfer ID Output	STRING	"	O		+	
Q_SP_TC	Transfer Counter Output	DInt	0	O		+	
QACT_TSN	Actual Transfer Set Name Output	DInt	0	O		+	
QACT_TID	Transfer ID Output	STRING	"	O			
QACT_TC	Transfer Counter Output	DInt	0	O		+	

Additional Information

- Section "Overview of the Block Description"

3.11 IEPAR_VIA: Equipment Parameter Module for the VIA Data Type

Object Name (Type + Number)

FB 264

Calling OBs

The OB in which you install the block (for example, OB1).

Function

The block is used to set the setpoints and to acquire the process values of the data type double integer for the via destination (location ID).

How the Block Functions

The signal applied to the inputs SP_VAL or ACT_VAL is transferred to the outputs Q_SP_VAL or QACT_VAL respectively. SP_VAL is set typically by the batch control or the IEPH faceplate, ACT_VAL by the user program.

Additional Information

- Section "I/Os of IEPAR_VIA"

3.11.1 I/Os of IEPAR_VIA

I/O (Parameter)	Meaning	Type	Default	I/O	Attr.	OC M	Permitted Values
ACT_VAL	Process value (input)	DInt	0	I			
EPE_CONN	IEPH/IEOP connection	DInt	0	I			
Q_SP_VAL	Setpoint (output)	DInt	0	O		+	
QACT_VAL	Process value (output)	DInt	0	O		+	
SP_VAL	Setpoint (input)	DInt	0	I		+	

Additional Information

- Section "Overview of the Block Description"

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