

SIMATIC S7- 400

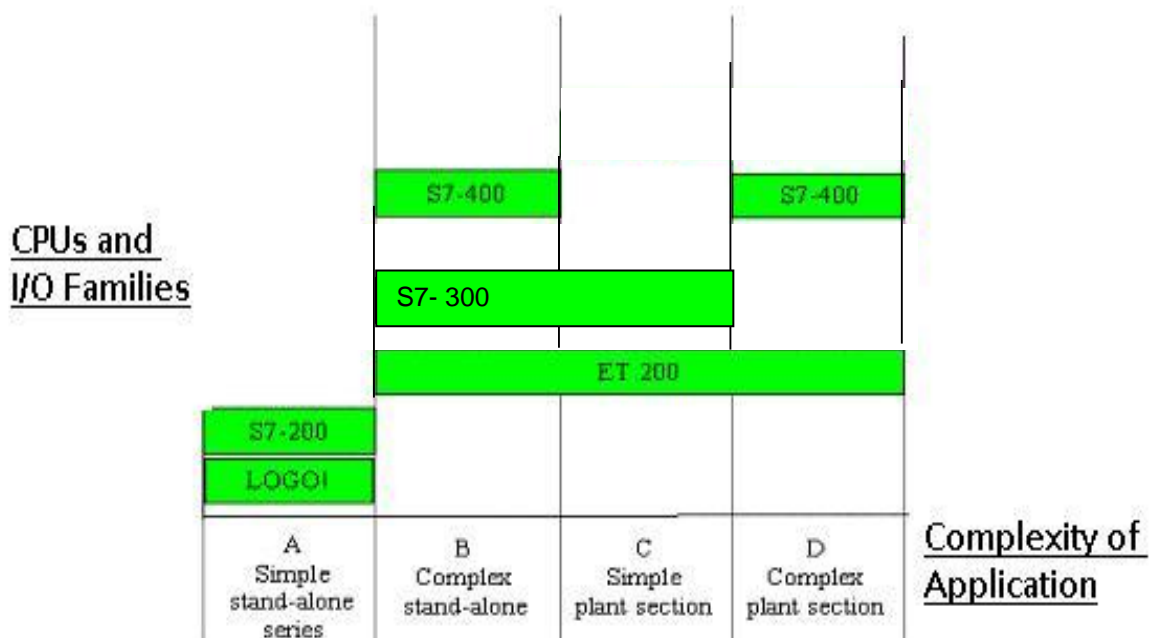
1. Introduction

- The power PLC for the mid to high-end performance ranges
- The solution for even the most demanding tasks for e.g. Closed loop control, Motion control etc.
- With a comprehensive range of modules and performance- graded CPUs for optimal adaptation to the automation task
- Flexible in use through simple implementation of distributed structures and extensive communications capabilities
- Easy installation, user-friendly handling, uncomplicated and fan-free design
- Simple and interactive **Programming software - STEP 7**
- **CiR**, Configuration in Run enables trouble-free expansion for larger applications even in run mode

2. Positioning of S7-400

➤ Positioning with respect to application

The positioning of product with respect to applications can be done as shown in fig below. Obviously there are some areas where S7-300 as well as S7-400 can be used. For such areas a choice has to be made judiciously based on the specific requirements of application.



➤ **S7-400 as...**

❖ **S7-400 as High Performance PLC**

S7-400 product family, graded with respect to performance, offer different variants suited to all sort of applications.

❖ **Special Processor of S7-400**

S7-400 CPUs operates on the basis of Special Processor called SP7 (32 bit ASIC). Following are the distinguishing features of the SP7 processor of S7-400

- Dual-processor architecture
- Optimized for MC7 micro code
- Instruction-modular restart
- Fan Free Operation
- Low electromagnetic radiation

The SP7 special processor of S7-400 offers high-end performance tailored to the typical automation application at higher end.

❖ **S7-400 with Efficient Memory**

SP7 processor reads the instruction code and data in same cycle, hence offers fastest processing speed.

❖ **S7-400 as Multiprocessing Platform of SIMATIC S7**

Powerful Back plane bus structure of S7-400 allows up to maximum of four CPUs to operate in a Central Rack- to perform multiprocessing. **There is no shared address area in case of S7-400 multiprocessing; which is a very distinguishing feature, which is not offered by the competitors having Multi computing option.**

❖ **S7-400 as Modular & Rugged PLC**

S7-400 is available with a wide spectrum of modules, which can be combined, as per the requirement, on modular basis.

- Various mounting racks, with integrated back plane bus and modules
- Immunity to the electromagnetic radiations.
- No slot rules
- Hot swapping of modules.

❖ **S7-400 as Redundant System Platform**

S7-400 modules form the basis of S7-400H/R – the fault tolerant (redundant) PLC. The fault tolerant system is ideally suited for the application where the downtime needs to be avoided.

- **S7-400 R:** Functionality of S7-41x CPUs along with its modules can be extended to get S7-400R configuration. The fault tolerance is achieved by means of two central controllers whose CPUs are connected by redundant link on MPI/Profibus or Ethernet. I/Os, configured as switched I/Os, are controlled via redundant PROFIBUS-DP lines. In the event of an error, there is a bump less transfer of control, with no loss of information.

- **S7-400 H:** S7-400 modules with CPU S7-414H/417H also form the basis of S7-400H system- the fault tolerant PLC. The fault tolerance is achieved by means of two central controllers whose CPUs are connected by redundant fiber optic link. In S7-400H the I/Os can be configured as "Switched I/Os" or as "Redundant I/Os" on redundant Profibus DP lines. In the event of an error, there is a bump less transfer of control, with no loss of information. The S7-400H design is based on "**Event Synchronization Principle**" which is suitable for extremely time critical applications e.g. Turbine Control, where the CPU switchover time should be of the order of few msec

- ❖ **S7-400 goes IT; Integration of Web Technology**
S7-400 supports the integration into the modern world of Web, supports TCP/IP industrial communication Protocol. The use of pluggable CP (CP 443-1 IT) allows the following functions:
 - Programming, downloading of user program and other function of Engineering Station.
 - Creation of HTML pages (located at CP).
 - Sending emails from user program of S7-400 only by means of function calls.

- ❖ **S7-400 with State of Art Programming Tools**
CPUs of S7-400 provide the support of Programming Software STEP 7. There are also higher-level languages and graphical Engineering tools based on STEP 7.

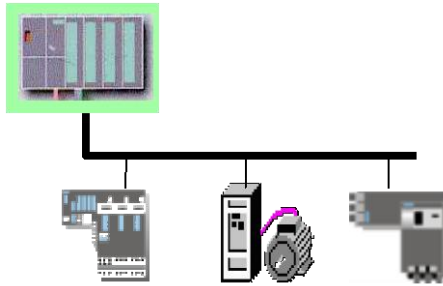
- ❖ **S7-400 as Component of TIA**
S7-400 Product family support the TIA concept and allows the vertical integration of Automation system in any plant.

- ❖ **S7-400 with Strong Communication**
As a component of TIA family, S7-400 strongly supports the central element of TIA family- Communication Networks. Following communication protocols are actively supported:
 - Industrial Ethernet (IEEE 802-3 and 802.3 u) TCP/IP
 - PROFIBUS (IEC 61158/EN 50170)
 - AS-Interface (EN 50295)
 - EIB (EN 50090 ; ANSI EIA 776)
 - Point –to-Point Communication (e.g. RK 512, ASCII)

- ❖ **S7-400 with Effective Diagnostic Function**
Integrated intelligent Diagnostic features of S7-400 permanently monitors the functionality of the system (including Signal Modules), process, registers errors and specific system events.

All these diagnostic features help our customer to reduce the downtimes and increase productivity.

❖ **S7-400 as Central System with Distributed Periphery**



Shows the PLC, S7-400 as central system with distributed periphery (e.g. DP slaves).

❖ **S7-400 as an Intelligent Slave**

S7-400 CPUs can be used as Intelligent DP-Slave. This functionality makes overall processing speed of Automation structure faster (making the use of S7-400 as DP slave possible, where extensive and fast preprocessing of data is required), there by reducing the startup times and increasing overall productivity.

❖ **CPU firmware up gradation and Software requirements**

Firmware of S7-400 CPUs, can be updated using S7 memory card of the type Flash 2 MB, or it can be updated by downloading respective package from the Internet

❖ **S7-400 platform with CiR Foundation**

S7-400 with the feature called Configuration-in-Run (CiR), offers the possibility of “reaction free” modifications of configurations during operation. With this feature the above procedure will be simplified as follows:

1. Modify configuration with required changes.
2. Download the modified configuration

Result...

...no need to go into STOP mode. Changes in the hardware configuration can be implemented without any adverse effect on the running operation.

CiR can be implemented in configurations based on S7-400 CPUs with Firmware V 3.1. CiR can also be implemented in S7-400H CPUs, when used in Single mode. Following changes can be implemented using CiR, in a S7-400 CPU while a plant is running

- Add/remove distributed I/O units (DP/ PA slaves)
- Add/remove new I/O modules in ET 200M I/O system
- Reparameterization of I/O modules in ET 200M I/O system

❖ **S7-400's compatibility with S5-Systems**

S7-400 can be expanded in a distribution with expansion units from SIMATIC S5-115U or S5-135U/-155U series of the existing S5 systems. Apart from connection of S7 to S5 system, the performance of entire system also boosts. The following S5 racks can be connected to S7-400 system via Im 463:

- ER 701-2 and ER 701-3 of SIMATIC S5-115U
- EG 183U and EG 185U of SIMATIC S5-135U/-155U

❖ **S7-400 with S5 Intelligent Periphery**

Intelligent Periphery modules of S5, have the advantage of the intelligent modules is that they can execute their time critical tasks independently. This relieves the CPU load and can execute on its higher order control tasks. For all information ordering data for all these intelligent modules and accessories chapter 4 of ST70 can be referred.

3. Modules for S7-400

➤ **Main CPU Module**

Different CPU modules are available. Some of specifications of CPU modules are given below

Features	CPU 412-1	CPU 412-2	CPU 414-2	CPU 414-3	CPU 416-2	CPU 416-3	CPU 417-4
Work Memory (Data + Code)*	144 KB	256KB	512KB	1.4 MB	2.8 MB	5.6 MB	20MB
Processing times							
Bit/ Word/ Fixed point operation	0.1µsec	0.1µsec	0.06µsec	0.06µsec	0.04µsec	0.04µsec	0.03µsec
Floating point	0.3µsec	0.3µsec	0.18µsec	0.18µsec	0.12µsec	0.12µsec	0.09µsec
Timers/Counters (S7)	2048/2048	2048/2048	2048/2048	2048/2048	2048/2048	2048/2048	2048/2048
Slot required for CPU on the rack	1 Slot	1Slot	1Slot	2 Slot	1 Slot	2 Slot	2 Slot
Max DI/DO	32768	32768	65536	65536	131072	131072	131072
Of which central	32768	32768	65536	65536	131072	131072	131072
Max AI/AO	2048	2048	4096	4096	8192	8192	8192
Of which central	2048	2048	4096	4096	8192	8192	8192
Communication interfaces							
First Interface	MPI, DP Master/ Slave	MPI, DP Master/ Slave	MPI, DP Master/ Slave	MPI, DP Master/ Slave	MPI, DP Master/ Slave	MPI, DP Master/ Slave	MPI, DP Master/ Slave
Second Interface	None	DP Master/ Slave	DP Master/ Slave	DP Master/ Slave	DP Master/ Slave	DP Master/ Slave	DP Master/ Slave
Third Interface	None	None	None	Profibus DP**	None	Profibus DP**	Profibus DP**
Forth Interface	None	None	None	None	None	None	Profibus DP**
Multicomputing With UR1 or UR2	Max. 4 CPUs	Max. 4 CPUs	Max. 4 CPUs	Max. 4 CPUs	Max. 4 CPUs	Max. 4 CPUs	Max. 4 CPUs

*Memory is equally divided among Data and Code for e.g. CPU 412-1 has **72KB Data and 72KB Code memory**

**Separate Insertable interface sub module, IF-964-DP, a Profibus DP module.

Note-

All CPU's have Load memory

- Integrated **256 Kbytes RAM**
- Expandable FEPRAM With memory card (FLASH) up to 64 Mbytes
- Expandable RAM With memory card (RAM) up to 64 Mbytes

❖ **Backplane Structure**

Backplane bus can support two types of buses, P bus & K bus. P bus is the peripheral bus, which is required for the communication with I/O modules. This is also called as I/O bus.

K bus is the Communication bus, which is required for the communication with intelligent modules like CP443-IT

❖ **S7-400 Racks**

Three types of racks are available

- **UR - Universal Rack**
- **CR - Central Rack**
- **ER - Extension Rack**

The specifications are as follows

Type	Slots	P bus	K bus	Local P bus segments
UR 1	18	Yes	Yes	-
UR 2	9	Yes	Yes	-
CR 2	10 + 8	Yes	Yes	Yes 2 Seg.
CR 3	4	Yes	Yes	
ER 1	18	Yes	-	-
ER 2	9	Yes	-	-

Here, **P** -Peripheral bus & **K** -Communication bus

➤ **Digital I/O Module**

These modules are available as

- ❖ **SM421**- Digital Input Module
- ❖ **SM422**- Digital Output Module

These modules are available in different Power supply ranges. Also some of them provides process and diagnostic interrupt.

➤ **Analog I/O Module**

These modules are available as

- ❖ **SM431**- Analog Input Module
- ❖ **SM432**- Analog Output Module

All I/O modules require 48 pin front connectors

➤ **Interface Module**

These Modules are required for the Interfacing between Central & Expansion Rack. They are available in different types according to number of expansion units to be connected to central rack and distance between them.

	IM 460 - 0..	IM 461 - 0..	IM 460 - 1..	IM 461 - 1..	IM 460 - 3..	IM 461 - 3..	IM 463 - 2..	IM 314 (S5)
Sender (CR) Receiver (ER)	x	x	x	x	x	x	x	x
with 5V supply	--	--	Yes	Yes	--	--		
with K bus* performance	Yes	Yes	No	No	Yes	Yes	No	No
max. distance in m	5	5	1.5	1.5	102	102	600	600

Please note- 1) Out of 21 ERs, up to 6 can be K bus nodes

2) IM with K-bus is must when using FMs, CPs other than Rack 0

❖ **IM's Overview**

IM's characteristics can be summarised as follows,

Type	Connection	Following are transferred	max. distance	max. number in CR	max. number of ERs on one send IM (tier)
IM 460-0	Centralized	P bus	5 m	6	4
IM 461-0		K bus		-	-
IM 460-1	Centralized	P Bus	1,5m	2	1
IM 461-1		Power supply		-	-
IM 460-3	Distributed	P bus	102 m	6	4
IM 461-3		K bus		-	-
IM 463-2	Distributed	S5 bus	600 m	4	4
S5-IM 314				-	-

➤ **Communication Module-**

These Modules are required for providing different communication options such as Ethernet, Internet, Point-to-Point etc. Point to point supports different serial protocols like 3964 (R), ASCII, Printers etc. with higher transmission rates
The list of communication module is available in the next section

4. List of Modules

Sr. No	MLFB	Description	Remark
CPU Modules			
	6ES7412-1XF04-0AB0	CPU 412-1 , 96 KB, power supply 24 V DC, MPI/PROFIBUS DP master interface, slot for memory card, incl. Slot number labels, 2 keys	
	6ES7412-2XG04-0AB0	CPU 412-2 , 144 KB, power supply 24 V DC, MPI/PROFIBUS DP master interface, slot for memory card, incl. Slot number labels, 2 keys	
	6ES7414-2XG04-0AB0	CPU 414-2 , 256 KB, power supply 24 V DC, MPI/PROFIBUS DP master interface, slot for memory card, incl. Slot number labels, 2 keys	
	6ES7414-3XJ04-0AB0	CPU 414-3 , 768 KB, power supply 24 V DC, MPI/PROFIBUS DP master inter-face, PROFIBUS DP master inter-face, slot for memory card, slot for IF module, incl. slot number labels, 2 keys	
	6ES7416-2XK04-0AB0	CPU 416-2 , 1.6 MB, power supply 24 V DC, MPI/PROFIBUS DP master interface, PROFIBUS DP master interface, slot for memory card, slot number labels, 2 keys	
	6ES7416-3XL04-0AB0	CPU 416-3 , 3.2 KB, power supply 24 V DC, MPI/PROFIBUS DP master inter-face, PROFIBUS DP master inter-face, slot for memory card, slot for IF module, incl. slot number labels, 2 keys	
	6ES7417-4XL04-0AB0	CPU 417-4 , Main memory 4 MB, power supply 24 V DC, MPI/PROFIBUS DP master interface, PROFIBUS DP master interface, 2 slots for IF modules, slot for memory card, incl. slot number labels, 2 keys	
Digital Modules			
SM 421 digital input modules			
	6ES7421-7BH01-0AB0	16 inputs, 24 V DC, with process/diagnostics interrupt	
	6ES7 421-1BL01-0AA0	32 inputs, 24 V DC	

Sr. No	MLFB	Description	Remark
	6ES7 421-1EL00-0AA0	32 inputs, 120 V AC/DC	
	6ES7 421-1FH20-0AA0	16 inputs, 120/230 V AC/DC, inputs to IEC 1131-2 Type 2	
	6ES7 421-7DH00-0AB0	16 inputs, 24 to 60 V AC/DC, with process / diagnostics interrupt	
SM 422 digital output modules			
	6ES7 422-1BH11-0AA0	16 outputs, 24 V DC; 2 A	
	6ES7 422-1BL00-0AA0	32 outputs, 24 V DC; 0.5 A	
	6ES7 422-7BL00-0AB0	32 outputs, 24 V DC; 0.5 A; with diagnostics capability	
	6ES7 422-1FH00-0AA0	16 outputs, 120/230 V AC; 2 A	
	6ES7 422-1HH00-0AA0	16 outputs, relay contacts	
Analog Modules			
SM 431 analog input modules			
	6ES7 431-0HH00-0AB0	16 inputs, non-floating, 13 bit	
	6ES7 431-1KF00-0AB0	8 inputs, floating, 13 bit	
	6ES7 431-1KF10-0AB0	8 inputs, floating, 14 bit, with linearization	
	6ES7 431-1KF20-0AB0	8 inputs, floating, 14 bit	
	6ES7 431-7QH00-0AB0	16 inputs, floating, 16 bit, process interrupt capability	
	6ES7 431-7KF00-0AB0	8 inputs, floating, 16 bit, process interrupt capability, for thermo-couples (current, voltage)	
	6ES7 431-7KF10-0AB0	8 inputs, floating, 16 bit, process interrupt capability, for thermal resistors	
SM 432 analog output modules			
	6ES7 432-1HF00-0AB0	8 outputs, floating, 13 bit	
Communication Modules			
	6ES7 440-1CS00-0YE0	CP 440 communications processor with one RS 422/485 (X.27) interface	
	6ES7 902-3AB00-0AA0 6ES7 902-3AC00-0AA0 6ES7 902-3AG00-0AA0	RS 422/485 connecting cable for linking to SIMATIC S7 5 m 10 m 50 m	
	6ES7 441-1AA03-0AE0	CP 441-1 communications Processor with one variable interface for interface submodules	
	6ES7 441-2AA03-0AE0	CP 441-2 communications Processor with two variable interfaces for interface submodules	
	6ES7 963-1AA00-0AA0 6ES7 963-2AA00-0AA0 6ES7 963-3AA00-0AA0	Interface submodules RS 232C (V.24) 20 mA (TTY) RS 422/485 (X.27)	
	6ES7 902-1AB00-0AA0 6ES7 902-1AC00-0AA0	RS 232 connecting cable 5 m 10 m	
	6ES7 902-2AB00-0AA0 6ES7 902-2AC00-0AA0 6ES7 902-2AG00-0AA0	TTY connecting cable 5 m 10 m 50 m	
	6GK7443-5FX02-0XE0	CP 443-5 Basic communications processor for connecting SIMATIC S7-400 to PROFIBUS; basic version for PROFIBUS-FMS with electronic manual, on CDROM	
	6GK7 443-5DX03-0XE0	CP 443-5 Extended communications processor for connecting SIMATIC S7-400 to PROFIBUS; Extended version for PROFIBUS DP, with electronic manual, on CD-ROM	
	6GK7 443-1EX11-0XE0	CP 443-1 communications processor for connecting SIMATIC S7-400 to Industrial Ethernet using TCP/IP, ISO and UDP; for S7 communication, S5-compatible communication (SEND/RECEIVE) with FETCH/WRITE with or without RFC 1006, 10/100 Mbit/s, with electronic manual, on CDROM	
	6GK7 443-1GX11-0XE0	CP 443-1 IT communications processor for connecting	

Sr. No	MLFB	Description	Remark
		SIMATIC S7-400 to Industrial Ethernet; for S7 communication, S5-compatible communication (SEND/RECEIVE), e-mail and www server, with electronic manual, on CD-ROM	
Interface Modules			
	6ES7 460-0AA01-0AB0	IM 460-0 interface module Send interface module for central connection up to 5 m; with C bus transmission	
	6ES7 468-1AH50-0AA0 6ES7 468-1BB50-0AA0 6ES7 468-1BF00-0AA0	468-1 connecting cable between IM 460-0 and IM 461-0; IM 460-3 and IM 461-3 0.75m 1.5 m 5 m	
	6ES7 461-0AA01-0AA0	IM 461-0 interface module Receive interface module for central connection up to 5 m; with C bus transmission	
	6ES7 461-0AA00-7AA0	Terminating connector for IM 461-0	
	6ES7 460-1BA01-0AB0	IM 460-1 interface module Send interface module for central connection up to 1.5 m; with 5 V power supply, without C bus transmission	
	6ES7 468-3AH50-0AA0 6ES7 468-3BB50-0AA0	468-3 connecting cable between IM 460-1 and IM 461-1; 0.75m 1.5 m	
	6ES7 461-1BA01-0AA0	IM 461-1 interface module Receive interface module for central connection up to 1.5 m; with C bus transmission	
	6ES7 460-3AA01-0AB0	IM 460-3 interface module Send interface module for distributed connection up to 102 m; with C bus transmission	
	6ES7 468-1CB00-0AA0 6ES7 468-1CC50-0AA0 6ES7 468-1CF00-0AA0 6ES7 468-1DB00-0AA0	468-1 connecting cable between IM 460-3 and IM 461-3 10 m 25 m 50 m 100 m	
	6ES7 461-3AA01-0AA0	IM 461-3 interface module Receive interface module for distributed connection up to 102 m; with C bus transmission	
	6ES7 461-3AA00-7AA0	Terminating connector for IM 461-3	
Memory cards			
	6ES7 952-0KH00-0AA0	FLASH EPROM 256 KB	
	6ES7 952-1KK00-0AA0	FLASH EPROM 1 MB	
	6ES7 952-1KL00-0AA0	FLASH EPROM 2 MB	
	6ES7 952-1KM00-0AA0	FLASH EPROM 4 MB	
	6ES7 952-1KP00-0AA0	FLASH EPROM 8 MB	
Power supply			
PS 405 power supply modules 24 V DC; 5 V DC, 24 V DC			
	6ES7 405-0DA01-0AA0 6ES7 405-0KA01-0AA0 6ES7 405-0KR00-0AA0 6ES7 405-0RA01-0AA0	4 A 10 A, wide range 10 A, redundant, wide range 20 A, wide range	
	6ES7 490-0AA00-0AA0	Power plug for PS 405 Spare part	
PS 407 power supply modules 120/230 V AC; 5 V DC, 24 V DC			
	6ES7 407-0DA01-0AA0 6ES7 407-0KA01-0AA0 6ES7 407-0KR00-0AA0 6ES7 407-0RA01-0AA0	4 A 10 A 10 A, redundant 20 A	
	6ES7 490-0AB00-0AA0	Power plug for PS 407 Spare part	
Accessories			
Front connectors, 48-pin, for signal modules, function modules; 1 unit			
	6ES7 492-1AL00-0AA0 6ES7 492-1BL00-0AA0 6ES7 492-1CL00-0AA0	• With screw-type terminals • With spring-loaded terminals • With crimp contacts	

Sr. No	MLFB	Description	Remark
Racks			
	6ES7 400-1TA01-0AA0	UR1 rack for central controllers and expansion units, 18 slots	
	6ES7 400-1JA01-0AA0	UR2 rack for central controllers and expansion Units, 9 slots	
	6ES7 401-2TA01-0AA0	CR1 rack for segmented central controllers, 18 slots, 2 local segments	
	6ES7 401-1DA01-0AA0	CR3 rack for central controllers and expansion units, 4 slots optimized for distributed automation solutions	
	6ES7 400-2JA00-0AA0	UR2-H rack for divided central controllers, 18 slots	
	6ES7 403-1TA01-0AA0	ER1 rack for expansion units, P bus only, 18 slots	
	6ES7 403-1JA01-0AA0	ER2 rack for expansion units, P bus only, 9 slots	

5. Configuration Examples

1. All I/Os centralised	
Requirement includes - Centralized I/Os - Analog I/Os are more - Faster CPU response Connectivity to SCADA via MPI/Profibus or Ethernet	Following modules can be used - UR1/UR2 Rack with 9 slots /18 slots (depending on total number of Modules) - Power supply PS 407 (4A/10 A) for backplane current - CPU S7-41x-2 with first interface for HMI/SCADA connectivity via MPI/Profibus. - Ethernet CP 443-1, If connectivity via Ethernet is reqd. - Signal Modules SM 421, SM 422, SM 431 or SM 432 (SM 431 with 16 Analog channel gives price advantage with a saving in number of slot on rack)

Single Rack Centralised Configuration

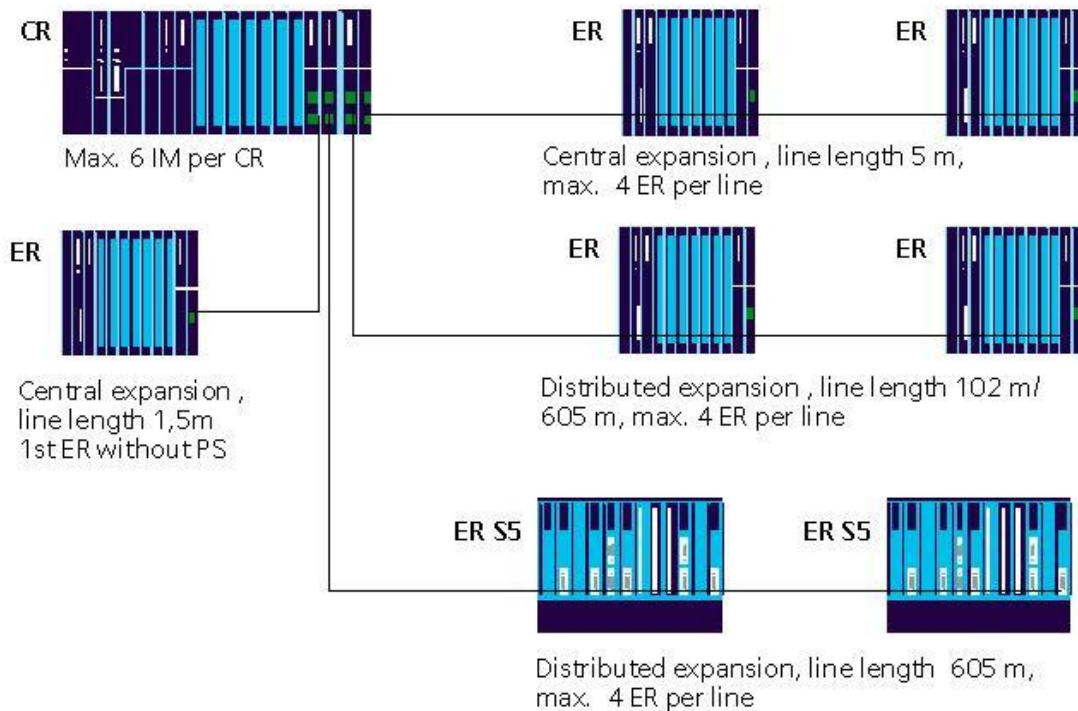
Central Rack or Universal rack



2. All I/Os centralised (more than 18 modules)	
Requirement includes - Centralised I/Os	Following modules can be used - UR1/UR2 Rack with 9 slots /18 slots - ER1/ER2 rack(s) depending on No. of Modules (less 18)

<ul style="list-style-type: none"> - Analog I/Os are more - Faster CPU response - Connectivity to SCADA via MPI/Profibus or Ethernet 	<ul style="list-style-type: none"> modules of UR rack) - Power supply PS 407 (4A/10 A) for backplane current in Central rack - CPU S7-41x-2 with first interface for HMI/SCADA connectivity via MPI/Profibus. - Ethernet CP 443-1, If connectivity via Ethernet is required. - Signal Modules SM 421, SM 422, SM 431 or SM 432 (SM 431 with 16 Analog channel gives price advantage with a saving in number of slot on rack) - upto 6 IM 460-x (depending on the number of ERs required) in Central Rack and cable length for expansion. - Each ER (total upto 21 rack can be connected to one Central rack) will need IM461-x and a Power supply for Back plane current on ER's P- Bus. (for the expansion distance needed, suitable IMs should be selected; Expansion can be achieved upto 600m)
3. Centralised controller with Remote/Distributed I/Os	
<p>Requirement includes</p> <ul style="list-style-type: none"> - Decentralized I/Os - Analog I/Os are More - Faster CPU Response - Connectivity to SCADA via MPI/Profibus or Ethernet 	<p>Following modules can be used</p> <ul style="list-style-type: none"> - CR3 Rack with 4 Slots (this saves cost as well as space in the panel) - Power Supply PS 407 normally 4 A is sufficient - CPU 41x-2/3 with first Profibus Interface for HMI SCADA - Ethernet CP, if Connectivity to SCADA via Ethernet - If few I/Os are to be connected to S7-400 CPU then second Profibus interface can be used to connect ET200 M/S/L <ul style="list-style-type: none"> - With ET200M I/O modules of S7-300 can be used - With ET200s fine modular ET200s I/Os can be used - ET200L has block I/O configuration - If I/Os are large then centralized expansion scheme can be used with IMs on Central rack and S7-400 I/Os on expansion rack(s). Expansion upto 600m possible

Multitrack Distributed Configuration

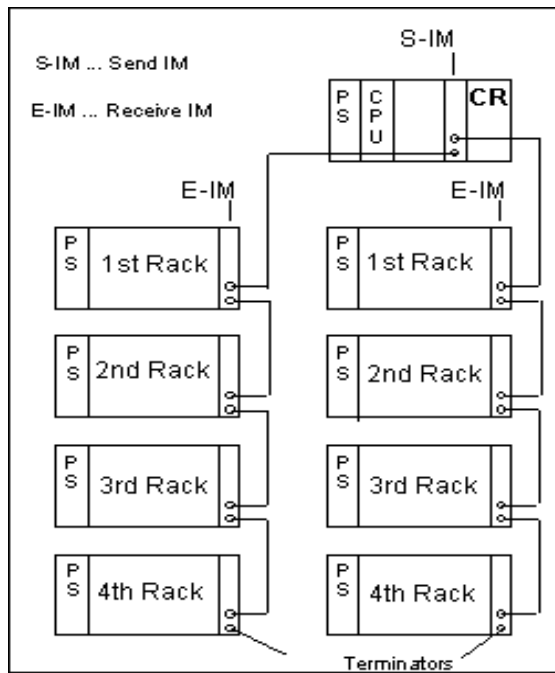


➤ IM's - Configuration rules

- The receive IM must be plugged into slot 9 of the ER (UR 2, ER 2) or slot 18 (UR 1, ER 1)
- S7-400 send IMs are not permissible in S7-400 ERs (no 2nd hierarchy)
- The last receive IM in the tier must be fitted with the relevant terminator
- Insertion and removal of the IMs and their connecting cables not permissible when powered.

Different IM's Configuration

a) IM's without Power Supply Transmission



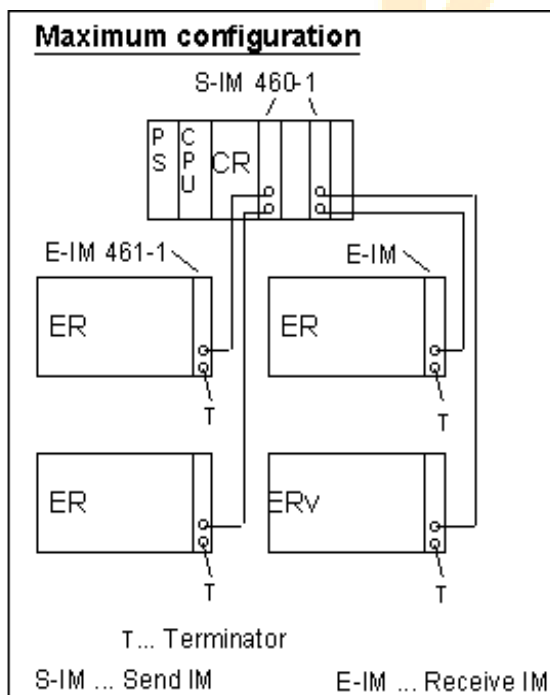
• **Centralized and distributed configuration**

- IM 460-0 / IM 461-0 (central)
- IM 460-3 / IM 461-3 (distributed)

• **Characteristics**

- Up to 4 expansion racks can be connected per tier
- Up to **6 send IMs** possible in the central rack
- Max. distance from CR to last ER in tier
Central: - **5 m**
Distributed:- **605 m**
- P bus and K bus are transmitted
- Up to **21 Expansion Racks** can be connected to the CR

b) IM's with Power Supply Transmission



• **Centralized configuration**

- IM 460-1 / IM 461-1

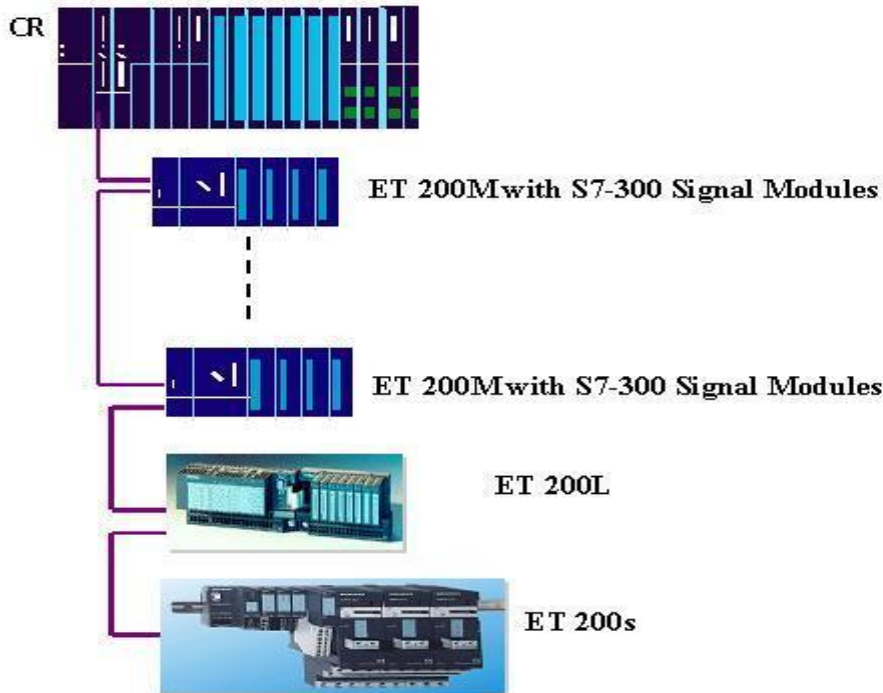
• **Characteristics**

- Up to 1 expansion rack can be connected per tier
- Up to 2 send IMs possible in the central rack
- max. distance from CR to ER in the tier: **1.5 m**
- Only P bus is transmitted
- Transmission of the 5 V DC supply voltage with max. 5A/tier
- 24 V DC not transmitted
- No backup

! Terminator not required for the new IM 461-1

Distributed Configuration with S7-400 on Profibus

Central Rack with S7-41x-2 CPU



4. Connecting existing S5 system with S7-400 system

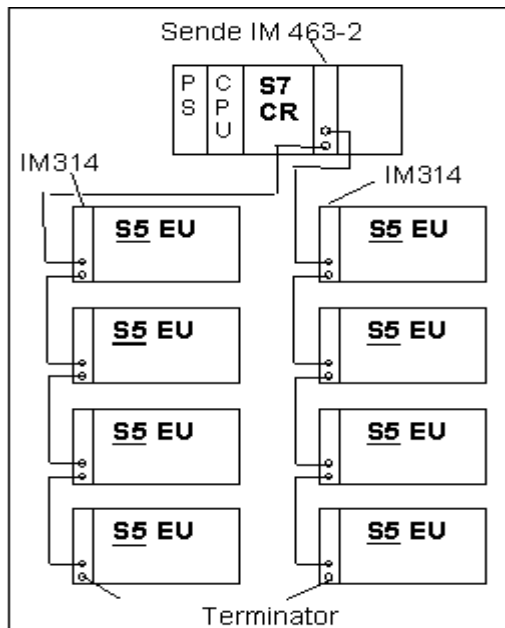
Requirement includes

- Existing S5 I/Os to be interfaced or to be upgraded with S7-400
- Faster CPU response
- Connectivity to SCADA via Profibus or Ethernet

Following modules can be used

- CR3 Rack (4 Slots) if only CPU is required, (this saves cost as well as space in the panel)
- If some S7-400 I/Os are also required to be used, then UR1/UR2 can also be used.
- Power Supply PS 407 suitable for Back plane current requirement.
- CPU 41x-2/3 with one Profibus Interface for HMI SCADA
- Ethernet CP, if Connectivity to SCADA via Ethernet
- IM 463-2 plugged into the SIMATIC S7-400 Controller.
- IM 314 plugged into the S5 expansion unit - ER701-2, ER701-3, EG 183U and EG 185 U.
(Maximum 32 Simatic expansion units can be connected to an S7-400 with a transmission distance upto 600m between the central controller and last unit)

Distributed Connection to S5 EU's using IM's



•Distributed configuration with S5 EUs

- IM 463-2 / IM 314

•Characteristics

- Up to 4 S5 expansion units can be connected per tier
- Up to 4 send IMs are possible in the central rack
- max. distance from CR to the last EU in the tier: **600 m**
- Parallel S5 bus is transmitted
- S5 expansion units can include: EU 183 U, EU 185 U, ER 701-2, ER 701-3
- max. number of S5 EUs as for S5
- Centralized expansion of the S5-EUs possible with IM 300 / IM 312

6. Advantages

- Securing know-how through password protection
- Large number of I/Os, PID Control loops
- Increasing productivity through high performance like faster execution time
- Reducing cost by saving time during commissioning
- Reducing downtime thanks to high features like advanced diagnostics & Hot Swapping (Module replacement in Run).
- Coverage of wider range of applications for e.g. Motion control, Process control etc.
- High requirements for data processing e.g. indexed access of arrays.