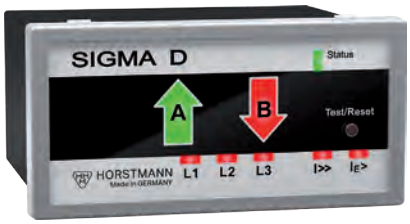
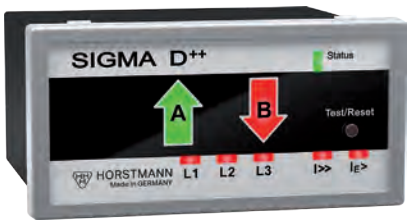
Sigma D | Sigma D+ | Sigma D++

Directional fault indicator



Sigma D

Sigma D+



Sigma D++

Product features

- CT powered directional short-circuit and directional earth fault indicator for all distribution networks / neutral point treatments
- Earth fault detection with up to five different earth fault detection methods, also in combination
- Fully automatic voltage calibration
- Easy and flexible parameter setting via DIP switch or USB port
- Event memory for fault evaluation
- Multicolour LED status display
- Remote signalling via freely programmable relays
- Sigma Explorer Software: Commissioning and parameterisation via front accessible USB port

Special features of Sigma D++

- Only 3 single-phase current sensors needed for all earth fault detection methods
- Wide-range power supply 24 to 230 V AC/DC

Your advantages

- Immediate detection of fault direction
- No auxiliary supply required
- Fast commissioning and parameterisation
- Monitoring on site with USB and notebook

The Sigma D series are combined directional short-circuit and directional earth fault indicators for medium voltage distribution networks. The devices are current sensor powered. The voltage information will be taken from an integrated voltage detecting system (Wega series), from an HR interface or capacitive post insulators.

The Sigma D+ and Sigma D++ provide additional earth fault detection methods for compensated and isolated neutral networks.

The variants differ in regard of the transient earth fault method.

Sigma D+

For the transient earth fault method with the Sigma D+ a summation current sensor is mandatory, auxiliary supply is optional.

Sigma D++

For the transient earth fault method only three single-phase current sensors are needed, but auxiliary supply is mandatory. The connection of a summation current sensor is optional. For all other methods no auxiliary supply is needed.

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Technical data	Sigma D	Sigma D+	Sigma D++
Directional short-circuit indicator	■	■	■
Directional earth fault indicator	■	■	■
Earth fault detection methods	Earth short-circuit	Transient, earth short-circuit, cos ϕ or sin ϕ	
I>> short-circuit trip current	▪ DIP: 200, 300, 400, 600, 800, 1,000, 2,000 A, self-adjustment (200 – 2,000 A) ▪ SW: 50 – 2,000 A (1 A steps)		
tI>> response delay	▪ DIP: 40, 80 ms ▪ SW: 40 ms – 60 s		
$I_{E>}$ earth fault trip current	▪ DIP: off, 20, 40, 60, 80 100, 120, 160 A ▪ SW: 20 – 1,000 A (1 A steps)		
$tI_{E>}$ response delay	▪ DIP: 80, 160 ms ▪ SW: 40 ms – 60 s		
Measurement accuracy phase currents	±3 % (0 – 630 A, resolution 1 A) ±5 % (630 – 1,500 A) ±10 % (1,500 – 2,000 A)		
$I_{ET>}$ Transient method, trip current	–	10 – 100 A	10 – 500 A
$I_{EP>}$ Active current cos ϕ trip current	–	5 – 200 A	
$tI_{EP>}$ response delay	–	40 ms – 60 s	
$I_{EQ>}$ Reactive current sin ϕ trip current	–	5 – 200 A	
$tI_{EQ>}$ response delay	–	40 ms – 60 s	
Indication	LED fault direction arrows red / green		
Remote signal / communication	4 potential-free relay contacts, freely configurable		
Parameterisation	▪ USB 2.0 interface, connection to Explorer Software ▪ Via DIP switches on the device		
Remote contact	Potential-free permanent or momentary contacts (1 s), NC or NO Contact capacity: 230 V AC / 1 A / 62.5 VA max.; 220 V DC / 1 A / 60 W max.		
Reset	▪ By button ▪ Remote reset ▪ Automatic time reset: DIP: 2, 4, 8 or 24 h; SW: 1 min – 24 h ▪ Current and voltage restoration		
Voltage calibration	Manual / automatic		
Power supply			
CT powered	■	■	■
Internal power supply	Long-life lithium cell, active flashing time >900 h, shelf life ≥20 years		
External auxiliary supply	–	24 V AC / 24 – 60 V DC (optional)	24 – 230 V AC/DC (optional) **required for transient method**
Summation current sensor	–	**Required for transient method**	Optional
Housing	Polycarbonate, IP40		
Temperature range	–30 to +70 °C		

Dimension drawing in catalogue on page 158, M3

Equipment set		
1 display unit Sigma D	Order no.	37-6000-001
3 single-phase current sensors		
1 voltage signal		
Equipment set		
1 display unit Sigma D+	Order no.	37-6100-001
3 single-phase current sensors		
1 summation current sensor (required for transient method)		
1 voltage signal		
Equipment set		
1 display unit Sigma D++	Order no.	37-6200-001
3 single-phase current sensors[1)]		
1 voltage signal		

Accessories
Installation system
Connection to remote monitoring
Wall-mounted housings
External signal lamp
Disassembly clip
Spring clip

1) Combination with summation current sensor possible: 3+1

Equipment set options

For directional fault indicators Sigma D series and ComPass B series

HORSTMANN GERMANY

Voltage signal

HR Jack module

HR interface cable

Wega with HR interface cable

Gas-/solid insulated switchgear

Integrated voltage detecting system Wega series

Air-insulated switchgear

Interface cable

Wega with interface cable

+

Current signal

Split-core single-phase current sensors for retrofit and new installations

Closed single-phase current sensors for new installations

+

Directional short-circuit and earth fault indicators

Sigma D series

ComPass B series

[+]

Resistive voltage signal

Optional supplement

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Single-phase current sensors

HORSTMANN GERMANY

For new installations on bushings

for Sigma 2.0 series, Sigma D series, ComPass series

ABB

Type:
Safelink, SafePlus, SafeRing
Ø 79,5 mm / 84 mm

Order no.
3 x 49-6025-000 or
3 x 49-6025-301

Driescher

Type:
MINEX, MINEX C, G.I.S.E.L.A.
Ø 84 mm

Order no.
49-6025-601[1)]

EATON

Type:
XIRIA
Ø 79,5 mm / 84 mm

Order no.
3 x 49-6025-000 or
3 x 49-6025-301

Lucy Electric

Type:
AegisPlus
Ø 84 mm

Order no.
3 x 49-6025-601

Ormazabal

Type:
ga, gae, ge
Ø 84 mm

Order no.
3 x 49-6025-311

Schneider Electric

Type:
RM6
Ø 84 mm

Order no.
3 x 49-6025-301

Schneider Electric

Type:
FBX
Ø 84 mm

Order no.
1 x 49-6025-622

Siemens

Type:
8DJH (cable panel)
Ø 84 mm

Order no.
1 x 49-6025-630

Siemens

Type:
NXPLUS C,
8DJH (cubicle width 430 mm)
Ø 84 mm

Order no.
3 x 49-6025-611

For screened connectors only. Insulation level: 0.72 / 3 kV.
1) Without retaining plates. Order no. with retaining plates on request

For retrofit on insulated cables

for Sigma 2.0 series, Sigma D series, ComPass series

Conductor Ø [mm]	Cable length [m]	Order no.
15 – 55	3.00	49-6024-001

Conductor [mm]	Cable length [m]	Order no.
15 – 65	3.00	49-6024-010
15 – 78 (1250 A)	3.00	49-6024-130

Summation current transformers

HORSTMANN GERMANY

For installation on insulated cables

for Sigma *plus*

Conductor Ø [mm]	Cable length [m]	Order no.
40 – 115	3.00	49-6013-016

Conductor [mm]	Cable length [m]	Order no.
280 – 50, oval	3.00	49-6013-028

Conductor [mm]	Cable length [m]	Order no.
350 – 50, oval	3.00	49-6013-027

For installation on medium voltage cables

for Earth Zero, Earth Zero Flag, Earth 4.0

Conductor Ø [mm]	Cable length [m]	Order no.
60 – 150	3.0	49-6013-029

For installation on medium voltage cables

for Opto F+E 3.0

Conductor Ø [mm]	Trip currents[1] [A]	Order no.
up to 115	40, 80, 120 or 160	49-6014-009
up to 115	(10), (20), 40 or 80	49-6014-007

Conductor Ø [mm]	Trip currents[1] [A]	Order no.
280 x 50, oval	80, 120, 160 or 200	49-6014-022

1) adjustable

Conductor Ø [mm]	Trip currents[1] [A]	Order no.
350 x 50, oval	80, 120, 160 or 200	49-6014-021

1) adjustable

Summation current sensors

Summation current sensor, splittable

for Sigma D+, Sigma D++, ComPass B series

Conductor Ø [mm]	Cable length [m]	Order no.
220 – 250	4.00	49-6023-020

Product matrix

Capacitive and resistive voltage signal

HORSTMANN GERMANY





Function	Wega 1.2 C	Wega 2.2 C	Wega with interface cable	HR interface cable	Interface cable for post insulator
Capacitive voltage signal	■	■	■	■	■
Resistive voltage signal	–	–	–	–	–
Voltage indication	■	■	■	–	–
Voltage measurement	–	–	–	■	■
Connection to Sigma D series	■	■	■	■	■
Connection to ComPass B	■	■	■	■	■
Connection to ComPass B 2.0 series	■	■	■	■	■
New installation	■	■	–	–	–
Retrofit	–	–	■	■	■
Gas-/solid insulated switchgear	■	■	■	■	–
Air-insulated switchgear	■	■	■	■	■
Features					
Maintenance-free voltage detecting system	■	■	■	–	–
Relay contacts for remote monitoring	–	■	–	–	–
Voltage indication in combination with HR interface	–	–	■	–	–
Voltage indication in combination with post insulator	–	–	■	–	–
Direct connection from HR interface to directional fault indicator	–	–	–	■	–
Direct connection from post insulator to directional fault indicator	–	–	–	–	■
Capacitive interface integrated in switchgear	■	■	■	■	■
High-precision voltage measurement	–	–	–	–	–
Installation on T connector set	–	–	–	–	–
Installation on A cone	–	–	–	–	–
Connection to Wega possible	–	–	–	–	–
Voltage calibration necessary	■	■	■	■	■





C1A2-24	C1Ix	RDP series	RDG3-24	RDM3-24
■	■	–	–	–
–	–	■	■	■
–	–	–	–	–
–	–	■	■	■
■	■	–	–	–
■	■	–	–	–
■	■	■	■	■
–	■	■	■	■
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–	–	–	–	–
–	–	■	■	■
–	–	■	–	–
–	–	–	■	–
■	■	–	–	–
■	■	–	–	–

Capacitive voltage coupling

for Wega series in air-insulated switchgears

For Wega series

C1A2-24		Cable length [m]	Rated voltage [kV]	Order no. set
For medium voltage switchgear types[1)]				
Driescher:	LDTM-12/24			
Driescher:	TSL-20, TSL-G20			
Calor Emag:	C2-20,			
Calor Emag:	C3-10/20	4.5	12, 24	V38-9100-061-001
F&G:	Concordia Sprecher 12			
F&G:	EA20			
Leukhardt:	10 kV			

1) Further types of switchgear on request.
Wega series as well as set of connection cables see page 100 and 110 / 111

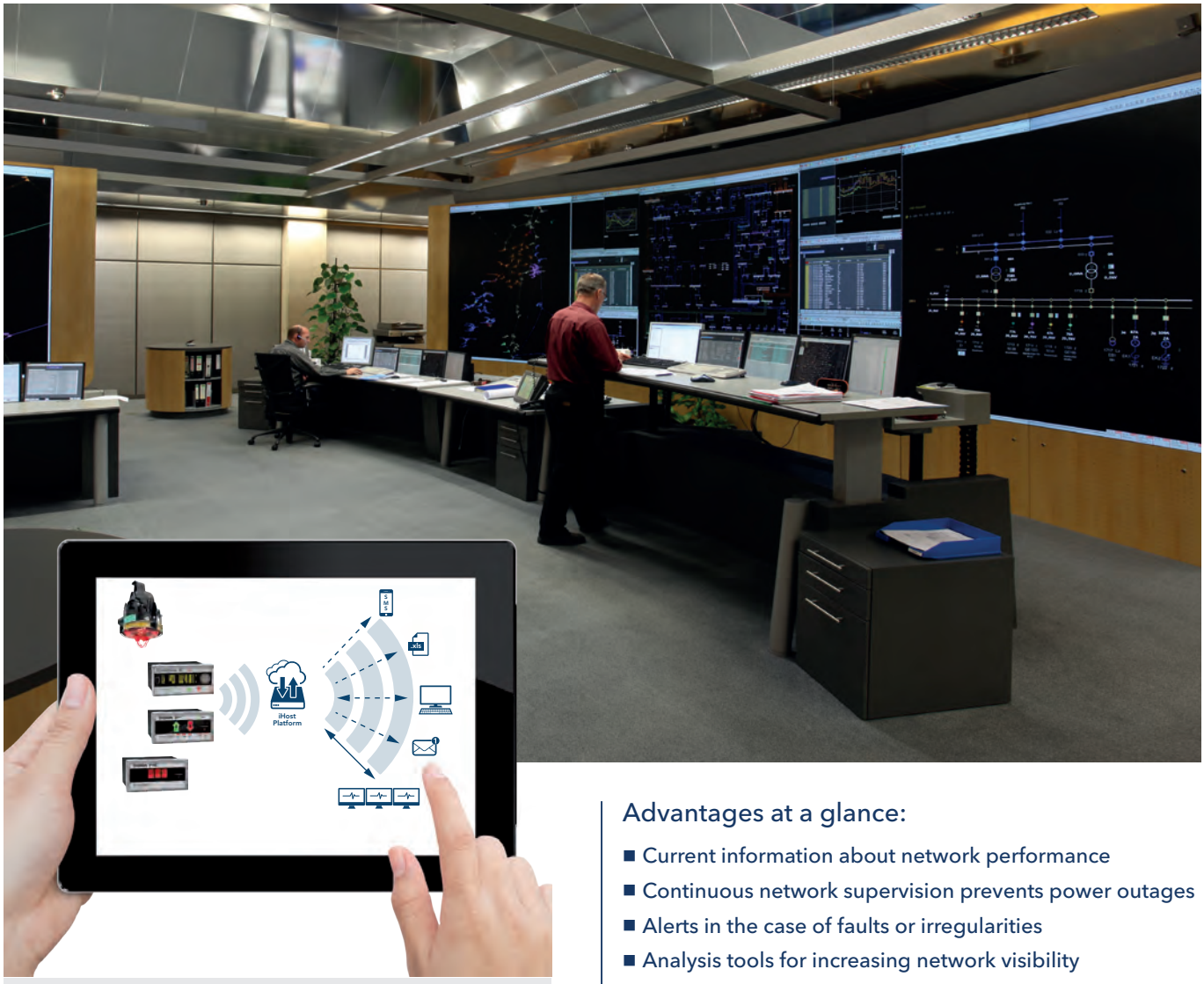
C1Ix	Voltage [kV]	Order no.
C1I1-12	max. 12	3 x 48-0101-002
C1I2-24	max. 24	3 x 48-0101-003
C1I3-36	max. 36	3 x 48-0101-004

Wega 1.2 C vario as well as set of connection cables see page 104 and 110 / 111

iHost

Monitor your entire grid around the clock

HORSTMANN GERMANY



iHost solution

Horstmann products are in step with the times:

As grids become increasingly complex and heterogeneous, greater demands are placed on the availability of electricity networks. The increasing use of renewable energy sources and the desire for decentralisation play important roles in this development.

The Horstmann solution:

Information based network monitoring – the iHost system reduces power outage times thanks to quicker availability of information.

The iHost system collects data from devices such as from the short-circuit and earth fault indicators in the field (e.g. of the Compass series – see page 44), evaluates the data in a data concentrator and shares it with the control room systems and / or mobile terminals. Fault information and exceeded limits can also be send by e-mail or SMS.

Advantages at a glance:

- Current information about network performance
- Continuous network supervision prevents power outages
- Alerts in the case of faults or irregularities
- Analysis tools for increasing network visibility

Product features:

- Data concentrator for short-circuit and earth fault indicators
  - Bundles and processes all data received from remote field devices
  - Provides data access at any time in various ways and devices
- Central management of all field devices – with one click
  - Grid monitoring: system overview, data analysis, health checks
  - Configuration and firmware updates from SCADA
- Data on demand
  - Customised visualisation of data and alarms
  - Individual notifications, generated automatically
- Embedded database
  - Grid data available from day one of installation
  - Flexible data provision for asset management, planning, engineers and further user

iHost

Remote monitoring software for SCADA

iHost Cloud

iHost Compact

iHost Cloud

For smaller scale projects or pilot schemes iHost Cloud is the best choice. Quick and easy implementation works without software installation. Handling is very user-friendly – all you need is a web-enabled device, your username and password. Customised notifications in case of a fault or alarms are possible via SMS and e-mail.

iHost Compact

If you want to see the data in your SCADA, iHost Compact is the right choice. With this solution iHost becomes part of your SCADA infrastructure. Installed on a physical or a virtual server iHost is a gateway that processes all data and forwards them directly to your SCADA. With iHost Compact you manage all remote devices installed in the power network.

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Feature	iHost Cloud	iHost Compact		
		Software	Software / hardware	Software/hardware/101
Hardware / Server arrangement	▪ High availability cluster ▪ Software as a service	Single installation of the ihost software on a customer supplied, pre-installed and virtual server	Single server, Horstmann supplied	Single server, Horstmann supplied with serial interface
Operating system (OS)	Cloud service / data centre	Microsoft Windows Server OS	Microsoft Windows Server OS	Microsoft Windows Server OS
Visualisation	Web browser	SCADA		
SIM cards for smart FCI / RTU	Available on request	Customer supplied SIM with private APN		
iHost licence type	Software included	One-time license fees		
RTU count	1 – 1,000	50 / 250 / 500		
Limits of users / user roles	50 / 3	2 / 2		
Maps	Yes	No		
Notifications	Yes (e-mail / SMS)	No		
Historian	Yes	No		
Data access API	No	No		
SCADA protocols	n/a	IEC60870-5-101[1)] IEC60870-5-104 DNP3 (serial)[1)] DNP3 (IP)	IEC60870-5-104 DNP3 (IP)	IEC60870-5-101 IEC60870-5-104 DNP3 (serial) DNP3 (IP)
Simultaneous SCADA channels	n/a	2		

1) Customers server hardware must contain serial interface.

iHost Cloud		
1 licence		
Cloud per RTU / year	Order no.	79-1010-000
1 SIM card		
Cloud – 1 SIM-S*	Order no.	79-1040-000
Cloud – 1 SIM-M**	Order no.	79-1041-000
iHost Compact Software		
1 licence		
Compact 50 (SW)	Order no.	79-1110-000
Compact 250 (SW)	Order no.	79-1120-000
Compact 500 (SW)	Order no.	79-1130-000
1 software installation package (remote VPN access)	Order no.	79-1160-000
1 technical support for 12 months	Order no.	79-1150-000
iHost Compact Software / hardware		
1 licence		
Compact 50 (SW/HW)	Order no.	79-1110-100
Compact 250 (SW/HW)	Order no.	79-1120-100
Compact 500 (SW/HW)	Order no.	79-1130-100
1 software installation package (remote VPN access)	Order no.	79-1160-000
1 technical support for 12 months	Order no.	79-1150-000
iHost Compact Software / hardware / 101		
1 licence		
Compact 50 (SW/HW/101)	Order no.	79-1110-101
Compact 250 (SW/HW/101)	Order no.	79-1120-101
Compact 500 (SW/HW/101)	Order no.	79-1130-101
1 software installation package (remote VPN access)	Order no.	79-1160-000
1 technical support for 12 months	Order no.	79-1150-000

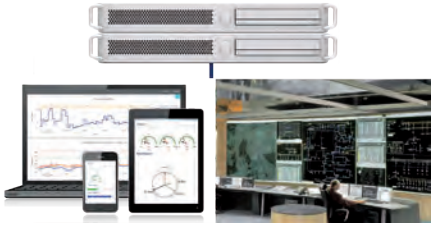
Accessories
Smart Navigator 2.0
Reporter 3.0
Reporter 4.0
ComPass AX12
ComPass BX12
Radio Reporter 2.0

*SIM-S: 2G, 3G; 10 MB data volume / month / SIM card
**SIM-M: 2G, 3G, 4G; 20 MB data volume / month / SIM card

iHost

Remote monitoring software for SCADA

iHost Solo



iHost Pro

With iHost Solo and iHost Pro all measured values as well as fault information are transferred directly to your SCADA and are available on mobile devices at the same time. All data is stored in iHost. Installed in your premises these solutions provide you multiple options regarding the use, analysis and visualisation of data.

iHost Solo

iHost Solo is designed for medium sized distribution networks whereas iHost Pro can handle the variety of remote devices, even of large distribution utilities.

iHost Pro

Complete with high availability resilience the system supports all departments of your company. The system can be tailored for user groups depending on their requirements.

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Feature	iHost Solo			iHost Pro
	Software	Software / hardware	Software/hardware/101	
Hardware / Server arrangement	Single installation of the ihost software on a customer supplied, pre-installed and virtual server	Single server, Horstmann supplied	Single server, Horstmann supplied with serial interface	Single installation of the ihost software on a customer supplied, pre-installed and virtual server
Operating system (OS)	Microsoft Windows Server OS	Microsoft Windows Server OS	Microsoft Windows Server OS	Microsoft Windows Server OS
Visualisation	Web browser and SCADA			
SIM cards for smart FCI / RTU	Customer supplied SIM with private APN			
iHost licence type	One-time license fees			Annual license fees
RTU count	100 / 500 / 1,000			2,000 / 3,500 / 5,000
Limits of users / user roles	50 / 10			Unlimited / 50
Maps	Yes (option)			
Notifications	Yes (e-mail / SMS)			
Historian	Yes			
Data access API	Yes			
SCADA protocols	IEC60870-5-101[1)] IEC60870-5-104 DNP3 (serial)[1)] DNP3 (IP)	IEC60870-5-104 DNP3 (IP)	IEC60870-5-101 IEC60870-5-104 DNP3 (serial) DNP3 (IP)	IEC60870-5-101[1)] IEC60870-5-104 DNP3 (serial)[1)] DNP3 (IP)
Simultaneous SCADA channels	2			10

1) Customers server hardware must contain serial interface.

iHost Solo Software		
1 licence		
Solo 100 (SW)	Order no.	79-1210-000
Solo 500 (SW)	Order no.	79-1220-000
Solo 1000 (SW)	Order no.	79-1230-000
1 software installation package (remote VPN access)	Order no.	79-1260-000
1 technical support for 12 months	Order no.	79-1250-000
iHost Solo Software / hardware		
1 licence		
Solo 100 (SW/HW)	Order no.	79-1210-100
Solo 500 (SW/HW)	Order no.	79-1220-100
Solo 1000 (SW/HW)	Order no.	79-1230-100
1 software installation package (remote VPN access)	Order no.	79-1260-000
1 technical support for 12 months	Order no.	79-1250-000
iHost Solo Software / hardware / 101		
1 licence		
Solo 100 (SW/HW/101)	Order no.	79-1210-101
Solo 500 (SW/HW/101)	Order no.	79-1220-101
Solo 1000 (SW/HW/101)	Order no.	79-1230-101
1 software installation package (remote VPN access)	Order no.	79-1260-000
1 technical support for 12 months	Order no.	79-1250-000
iHost Pro Software		
1 licence		
Pro 2000	Order no.	79-1310-000
Pro 3500	Order no.	79-1320-000
Pro 5000	Order no.	79-1330-000
1 software installation package (remote VPN access)	Order no.	79-1360-000
1 technical support for 12 months	Order no.	79-1350-000

Accessories
Smart Navigator 2.0
Reporter 3.0
Reporter 4.0
ComPass AX12
ComPass BX12
Radio Reporter 2.0

Reporter 3.0

Remote monitoring to iHost

HORSTMANN GERMANY

Reporter 3.0

Product features

- Detection and forwarding of digital states as generated e.g. by short-circuit or earth fault indicators, door contacts etc.
- Bidirectional data transfer to iHost
- Internal battery supply / no auxiliary supply necessary

The Reporter 3.0 is used for the remote signalling of short-circuits, earth faults and additional status reports (door contact, temperature sensor etc.) from a medium-voltage network that are reported by short-circuit and earth fault indicators. The received reports are transferred to iHost through a bidirectional data connection. The Reporter 3.0 is housed in robust, weatherproof housing for wall mounting and can be configured using Windows-based PC software and iHost.

Reported short-circuits and earth faults are securely sent to SCADA via the iHost system and can be retrieved by any web-enabled device at any time. Notifications can also be received by e-mail and / or SMS.

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Technical data	Reporter 3.0
Special features	▪ Routine call ▪ Automatic date and time synchronisation ▪ Transmission of signal field strength ▪ Temperature sensor ▪ Fault and status notification via SMS and / or e-mail
Inputs	▪ 16 digital inputs for potential-free relay contacts ▪ 2 analogue inputs (4 – 20 mA)
Communication	Bidirectional data connection to iHost
Indication (inside)	Control LEDs for data reception / connection
Power supply	Replaceable long-life lithium cell 7 – 10 years, min. 1,000 calls
Housing	Glass fibre reinforced polycarbonate, IP66
Installation	Wall mounting
Temperature range	–30 to +70 °C

Dimension drawing in catalogue on page 159, M10

Equipment set		
1 Reporter 3.0	Order no.	28-7330-022
1 iHost solution		
iHost Cloud		
iHost Compact		
iHost Solo		
iHost Pro		

Accessories
Fault indicators with relay contacts

Accessories

For short-circuit and earth fault indicators and integrated voltage detecting systems

HORSTMANN GERMANY

Wall-mounted housings

for the installation of short-circuit and earth fault indicators as well as integrated voltage detecting systems outside the switchgear

W x H x D
125 x 75 x 125 mm

Order no.
49-9001-001 bottom cable entry
49-9001-002 rear cable entry

W x H x D
125 x 175 x 125 mm

Order no.
V49-9001-004-001
incl. earthing bar

W x H x D
125 x 75 x 75 mm

Order no.
49-9001-006

W x H x D
290 x 77 x 200 mm

Order no.
V49-9001-007-001
incl. earthing bar

External signal lamps

for installation outside the switchgear

3 LEDs	Order no.
5 m connection cable, with battery, for permanent contact	49-0702-005
10 m connection cable, with battery, for permanent contact	49-0702-010
15 m connection cable, with battery, for permanent contact	49-0702-015

Bicolour 3 LEDs red/green	Order no.
3 m connection cable, with battery	49-0706-001

Bicolour 1 LED red/green	Order no.
2 m connection cable, with battery, without fibre optic cable (see page 57)	49-0704-001

Installation system

for Sigma D series and ComPass series

	Order no.
Tablet for parameter setting during installation or monitoring, incl. cover, pencil, power supply and USB cable	49-6022-010

Temperature sensor PT100

		Order no.
Temperature range	–50 to +180 °C	49-9090-013
Dimension	6 x 50 mm	
Cable length	10 m (silicone, 2 ferrules)	
Protection degree	IP65	

Fibre optic cables

	Order no.
Fibre optic cable 3 m (standard length for short-circuit CTs)	49-0602-009
Fibre optic cable 4 m (standard length for earth fault CTs)	49-0602-001
Fibre optic cable 1,8 m (standard length for external signal lamp)	49-6007-206

Accessories for Opto series

	Order no.
Cutting tool for fibre optic cables	49-0109-003

	Order no.
Transformer with cable for top-hat rail mounting (115 V – 230 V AC / 24 V – 48 V AC)	49-0921-002

	Order no.
Optical testing unit to excite the indicator for connection to the fibre optic cable plug	49-0109-002

Accessories for plug-in housing

	Order no.
Disassembly clip	49-9090-016
Disassembly clip for ComPass B 2.0 / Bs 2.0	49-9090-017

	Order no.
Spring clip suitable for 2 mm front plate thickness (standard)	49-9090-018
Spring clip suitable for 3 mm front plate thickness	49-9090-019